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A Review of the *Erebia dabanensis* Complex (Lepidoptera: Satyridae), with Descriptions of Two New Species

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Abstract. Considerable confusion exists in the literature associated with *Erebia youngi* (Holland, 1900) and *Erebia dabanensis* (Erschoff, 1861) in North America. This paper differentiates the five principal species previously grouped under these taxa and under *Erebia kozhantshikovi* (Sheljuzhko, 1925). Two new species are described: *Erebia lafontainei*, found on low shrub tundra throughout northern Alaska and adjacent Canada, and *Erebia phellea*, found on scree slopes throughout northern Alaska, northwest Canada, and in eastern Siberia.

Introduction

Recent examination of various "*E. youngi*" phenotypes collected in North America has revealed that three closely related but distinct species occur in this group. Our study of Palearctic specimens of *E. kozhantshikovi* and *E. dabanensis* shows that, although *E. dabanensis* is *E. youngi*'s closest phenotypic neighbor, and *E. kozhantshikovi* is *E. lafontainei*'s closest phenotypic neighbor, significant differences can be found between these two sets of sister species and neither are conspecific.

Early authors (Warren, 1969; dos Passos, 1972) suggested that *E. dabanensis* did occur in North America. Dos Passos (1972) claimed the *E. youngi rileyi* (dos Passos, 1947) holotype to be *E. dabanensis*; however, our examination of the *E. youngi youngi* lectotype and the *E. youngi rileyi* and *E. youngi herscheli* (Leussler, 1935) holotypes has shown that these specimens are all conspecific, although the allotype and paratypes of *E. youngi rileyi* include both of our new species.

We now have long series of *E. youngi, E. lafontainei,* and *E. phellea* from many localities in Alaska and northwest Canada, as well as long series of Palearctic *E. dabanensis, E. kozhantshikovi,* and *E. phellea*. We are able at this time to compare lengthy series of all Palearctic and Nearctic species

[1]Standard Deviation.

within the *E. dabanensis* complex for the first time, and advance the work initiated by dos Passos and Warren. In order to clarify the confusion previously found in this complex, we describe two new taxa and give detailed diagnoses of the species and subspecies within this complex as follows.

Key to Species

1a. VHW with distinct mesial and marginal bands; DFW fulvous ocelli with distinct black pupils, usually increasing in size from front to back; VFW ocelli fulvous to ruddy, never yellow; VHW hairs red to orange.....2

1b. VHW with obscure mesial and marginal bands (bands often more pronounced in populations from Denali Park, Alaska (formerly McKinley National Park), and the Bolshoi Annachag Range, Magadanskaya Oblast'); DFW fulvous ocelli with minute black pupils or pupils absent; however, when present, usually decreasing in size from front to back; VFW ocelli fulvous to yellow and very small; VHW hairs white to light brown; nudum of antenna with equal amounts of dark brown above and below a fine median ochre line (see Fig. 39); fringe of female checkered with dark brown at tips of veins; male genitalia with distal vertical processes of aedeagus sheath usually flat or slightly concave, valva narrowed at tip with many fine teeth across costa of ridge, this spined ridge averages 67.2% (range 62-72%) of costa of valva (see Figs. 50-55 & 58)..... **phellea**

2a. Nudum of antenna dark brown above median ochre line, ochre to dark brown below this median line (see Figs. 39, 41); ground color of male VHW postmedian-submarginal band dark brown with scattering of white scales which produces a hoary appearance; VHW mesial and marginal bands dark blackish brown to ruddy brown; fringe of female checkered with darker brown at tips of veins; male genitalia with distal vertical processes of aedeagus sheath usually flat or slightly concave, costa of valva rises abruptly (often at about 90°) to spined ridge.....3

2b. Nudum of antenna light ochre above and below a median dark brown patch (see Fig. 40); ground color of male VHW postmedian-submarginal band gray-brown, with a smooth, neat appearance, never hoary; VHW mesial and marginal bands medium brown to reddish-brown, never dark brown or blackish; male genitalia with distal vertical processes of aedeagus sheath usually greatly concave, costa of valva rises gradually to spined ridge.....4

3a. At present, known only from the Palearctic; pupils within DFW fulvous ocelli usually circular or oval; normally four large DHW ocelli with black pupils;male genitalia with valva elongated at tip and many coarse spines scattered across costa of ridge, this spined ridge

averages 55.8% (range 47-67% of costa of valva (see Figs. 47, 58)..... .....**dabanensis**

3b. At present, known only from North America; pupils within DFW fulvous ocelli usually elliptical or oval; zero to five DHW fulvous ocelli with black pupils, (*E. youngi rileyi* with fewer HW ocelli than eastern races); male genitalia with tip of valva not elongated and many coarse or fine teeth scattered across ridge, this spined ridge averages 43.0% (range 36-47%) of costa of valva (see Figs. 46, 58)..... **youngi**

4a. At present, known only from the Palearctic; DFW normally has five submarginal fulvous ocelli with black pupils; VHW postmedian-submarginal band appears brown to gray-brown, with heavy scattering of light gray scales within cell M_2; VHW mesial and marginal bands appear medium brown to ruddy brown; four to five large DHW fulvous ocelli contain black pupils; fringe of female dark brown, rarely checkered with slightly darker brown at tips of veins; male genitalia with spined ridge normally not elevated above costa of valva to any great degree (see Figs. 49b-49d), and many very fine spines scattered across costa of ridge which averages 50.1% (range 44-56%) of costa of valva (see Figs. 49, 57, 58)..... **kozhantshikovi**

4b. At present, known only from North America; DFW normally has four submarginal fulvous ocelli with black pupils; VHW postmedian-submarginal band appears pinkish due to heavy scattering of pearlescent pink scales over a ground color of gray-brown; VHW mesial and marginal bands reddish-brown to maroon; zero to three small DHW ocelli with minute brown pupils or pupils absent; fringe of female never checkered with dark brown at tips of veins; male genitalia has spined ridge elevated well above costa of valva, many coarse spines scattered across costa of ridge, and costa of spined ridge usually slightly concave, this spined ridge averages 54.3% (range 50-59%) of costa of valva (see Figs. 48, 58)..... **lafontainei**

Erebia dabanensis Erschoff, 1871

Diagnosis

Forewing length of male 21.1 ± 1.05[1] mm, range 19.1-23.0 mm (N = 20), and forewing length of female 21.4 ± 0.85 mm, range 20.0-23.0 mm (N = 12) (note: all above specimens from Bolshoi Annachag Range, Magadanskaya Oblast', U.S.S.R.).

Erebia dabanensis (Figs. 13-16, 34a, 34b) is characterized externally by the dorsal fulvous ocelli, containing black pupils which are more circular than those of *E. youngi* on the forewing and more numerous on the hindwing; by the ventral forewing submarginal fulvous ocelli, which are often coalesced into a broad fulvous band similar to that of *E. youngi*, while those of *E. kozhantshikovi* are never more than narrow fulvous halos which surround the black pupils; by the male's ventral hindwing, which is

[1]Standard Deviation.

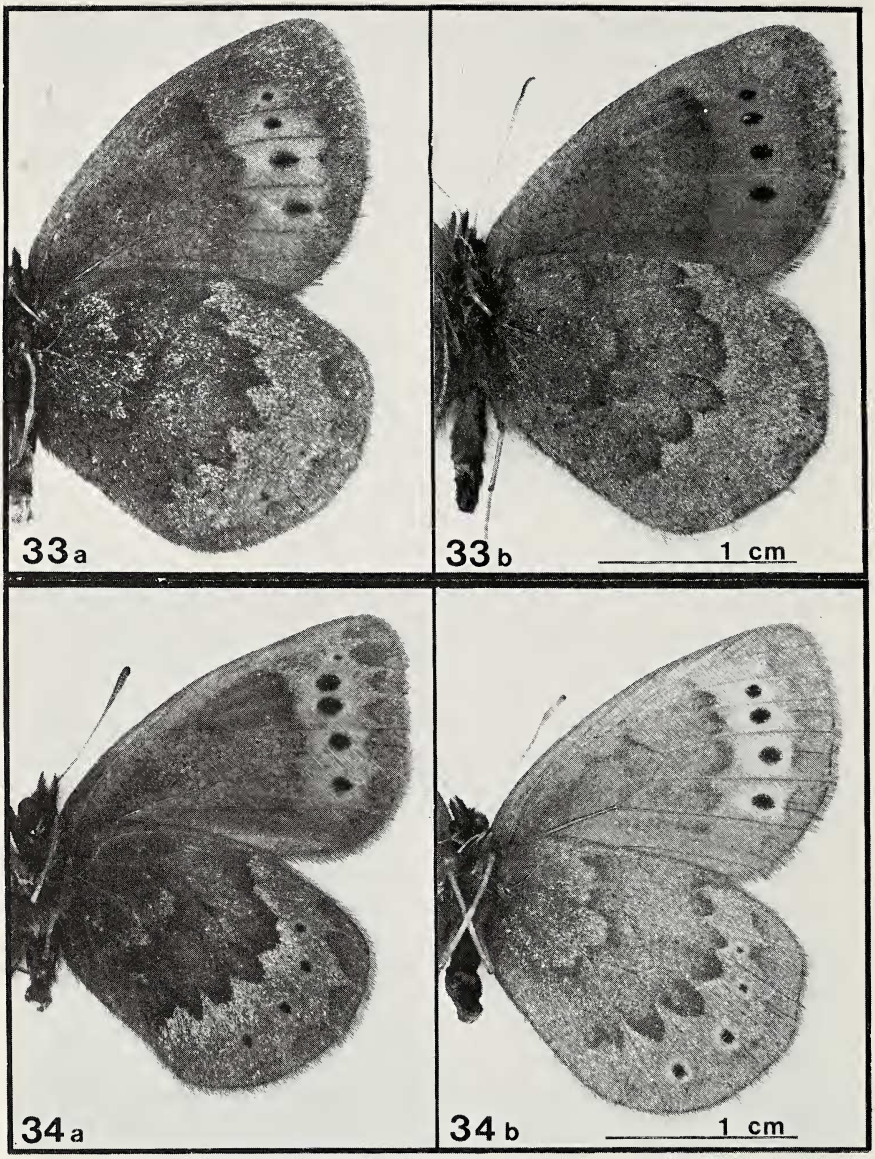


Fig. 33. *E. youngi*: (a) male ventral surface; (b) female ventral surface, both from Windy Pass, Ogilvie Mts., Yukon, 16 VI 1981, J. Troubridge, Leg.

Fig. 34. *E. dabanensis*: (a) male ventral surface; (b) female ventral surface, both from the Aborigen Station, Magadanskaya Oblast', 30 VI-24 VII 1980, K. Philip & A. Jones, Leg.

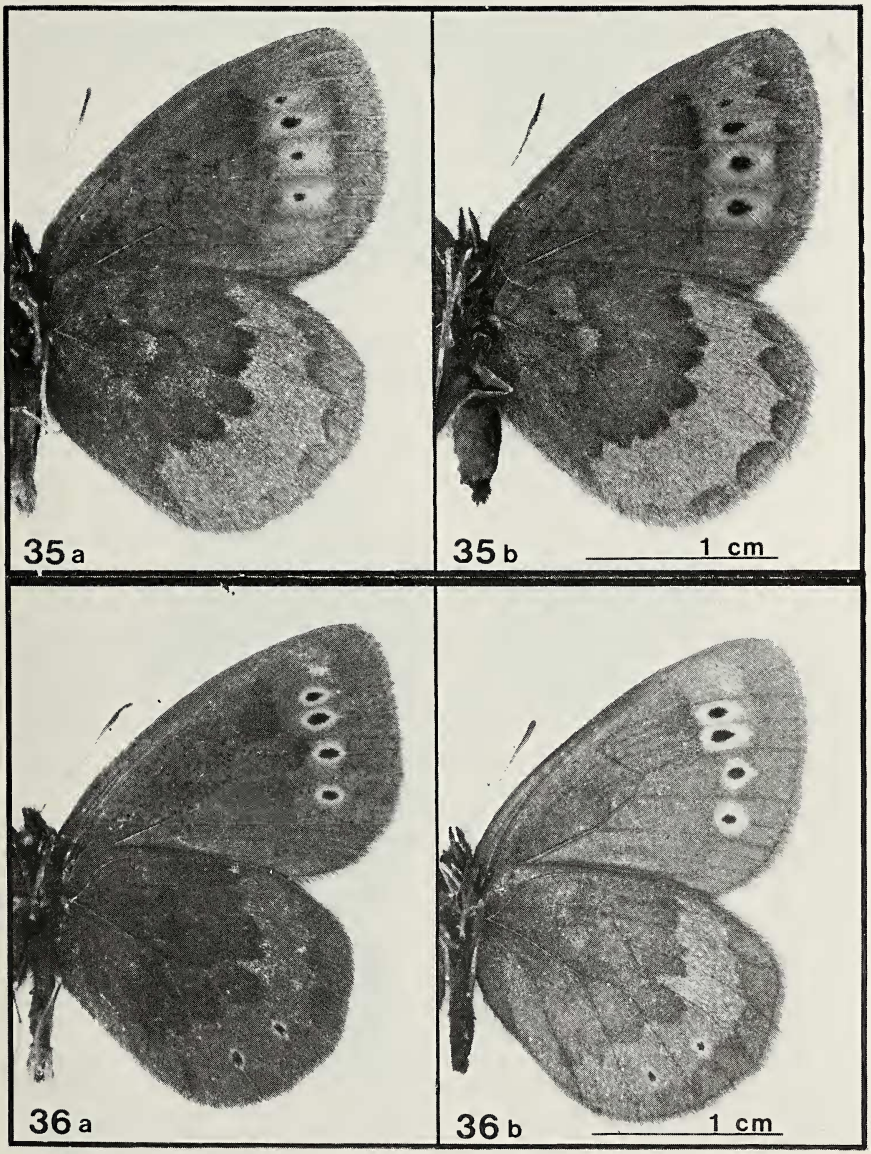


Fig. 35. *E. lafontainei*: (a) male ventral surface; (b) female ventral surface, both paratypes from Mt. Decoeli, St. Elias Mts., Yukon, 27 VI 1982, J. Troubridge & L. Lang, Leg.

Fig. 36. *E. kozhantshikovi*: (a) male ventral surface; (b) female ventral surface, both from the Aborigen Station, Magadanskaya Oblast', 28 VI 1978 (male) and 4 VII 1980 (female), K. W. Philip, Leg.

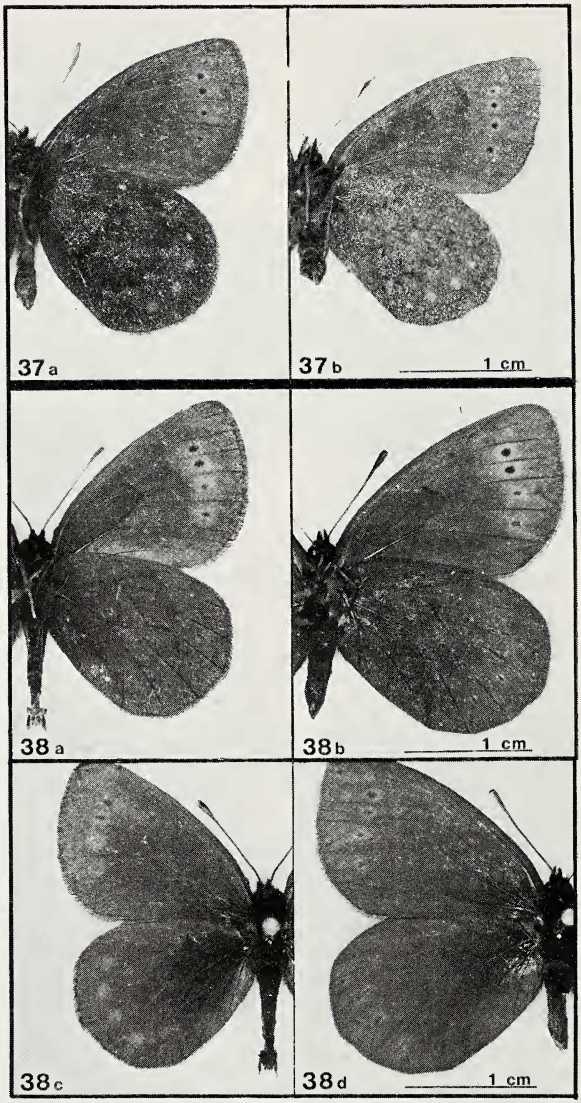


Fig. 37. *E. phellea*: (a) male ventral surface, mi 42, Council Rd., Seward Peninsula, Alaska, 29 VI 1971, D. G. Roseneau, Leg., (b) female ventral surface, Harris Dome, Seward Peninsula, Alaska, 2 VII 1971, K. W. Philip, Leg., both paratypes.

Fig. 38. *E. phellea*: (a) male ventral surface, (b) female ventral surface, (c) male dorsal surface, (d) female dorsal surface, all from the Aborigen Station, Magadanskaya Oblast', 29 VI-2 VII 1980, K. W. Philip & A. C. Jones, Leg.

grizzled with white scales in the postmedian and postbasal areas as in that of *E. youngi* (white scales absent in those of *E. lafontainei, E. youngi*, and most *E. phellea* from the Bolshoi Annachag Range); by the dark brown ventral hindwing color which overpowers the effect of the scattering of red scales as in *E. youngi* (*E. lafontainei* and *E. kozhantshikovi* appear reddish or maroon to light brown); by the distinct mesial and marginal ventral hindwing bands (obscure in most Nearctic *E. phellea* and many of the *E. phellea* from the Magadanskaya Oblast'); by the medial side of the antenna club, which is dark brown on the upper half and light ochre on the lower half similar to antennae of eastern races of *E. youngi* (Fig. 41) but very different from antennae of *E. lafontainei, E. kozhantshikovi,* and *E. phellea* (Figs. 39, 40). The female is further characterized by the light brown fringe checkered with darker brown at the tips of the veins, similar to those of *E. phellea, E. youngi,* and a very few *E. kozhantshikovi* (checkering absent in *E. lafontainei*). Internally *E. dabanensis* is characterized by the male valva which is narrowed at the tip and has a raised, spined ridge which occupies 55.8 ± 5.6%, range 47-67% (N = 20) of the entire length of the costa (see Figs. 47, 58). The spined ridge usually drops back to the neck of the costa at an angle of about 90° to the costa as in that of *E. youngi*, although the tip of the valva is much longer, narrower, and more pointed than that of *E. youngi*, in which the spined ridge occupies only 36-47% of the costa length. The spines on the ridge of the valva of *E. dabanensis* do not venture below the costa on the outside edge as far as those of *E. phellea* and are much coarser and fewer in number than those of *E. phellea.*

Distribution and Habitat

Erebia dabanensis ranges from the East Sayan Mountains to the Magadanskaya Oblast', northeastern Siberia. The type locality is the Khamar-Daban Range, just south of Lake Baikal (Buryatskaya, ASSR). Warren (1936) reports one record from the Polar Urals (Schuihya River) and one from the Anadyr Mountains, (now Chukotskii Range) on the Chukhotsk Peninsula—but he had not seen specimens and suspected that these records might refer to *E. kozhantshikovi*. K. Philip found this insect common in both taiga (open larch bog) and alpine tundra at the Aborigen Station, Bolshoi Annachag Range, upper Kolyma River, Magadanskaya Oblast', U.S.S.R., and the Alaska Lepidoptera Survey (ALS) collection has additional material (from Soviet volunteer collectors) from the Detrin River, Stokovoye, and Vetrenyy. All of these sites lie within the Okhotsk-Kolyma Uplands, north of Magadan.

Kurentzov (1970) reports that in the northeast of the Magadanskaya Oblast' *E. dabanensis* is replaced by *E. tundra* (Staudinger, 1887)—but Kurentzov appears to have been somewhat confused about both of these species as well as *E. kozhantshikovi* (see below under *E. tundra* for details) and until the material in Kurentzov's collection is checked, one cannot rely

on his determinations in this group.

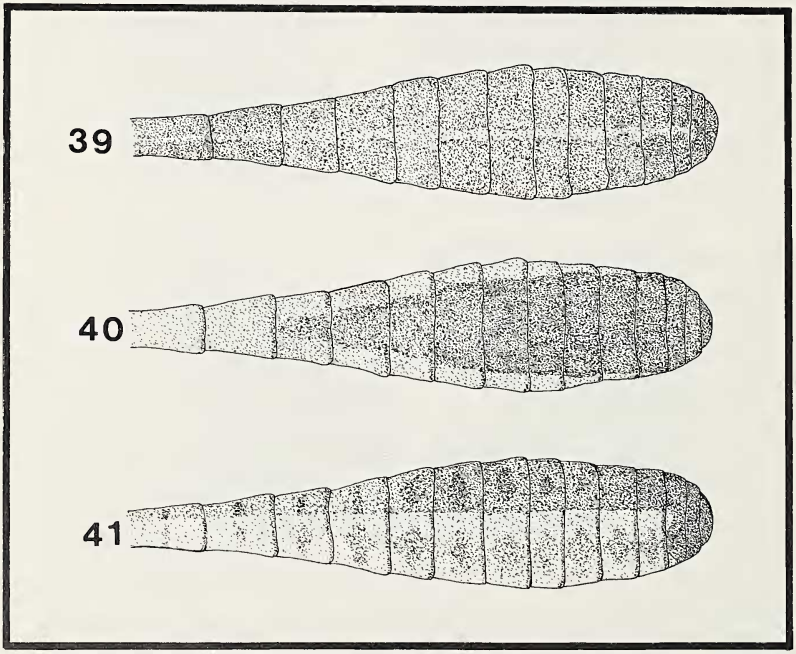
The flight period is late June to late July.

Erebia youngi youngi Holland, 1900

Diagnosis

Forewing length of male 20.2 ± 1.2 mm, range 18.0-23.5 mm (n = 20), and forewing length of female 20.1 ± 1.1 mm, range 17.5-22.0 mm (N = 20) (all specimens from the Ogilvie Mts., Yukon Territory, Canada).

Erebia youngi (Figs. 1-4, 33a, 33b) is characterized externally by the bright fulvous submarginal ocelli of the dorsal forewing which contain large elliptical or oval black pupils, the anterior two usually smaller than the posterior two as in those of *E. lafontainei* and *E. dabanensis*; by the ventral forewing, which has a wide submarginal fulvous patch rather than a series of fulvous submarginal ocelli; by the submarginal fulvous ocelli of the dorsal hindwing which average larger in size and number than those of *E. lafontainei* and *E. phellea* (but smaller and fewer in number than those



Figs. 39-41. Medial side of antenna club of: (39) *E. phellea* and most specimens of *E. youngi rileyi*; (40) *E. lafontainei* and *E. kozhantshikovi*; (41) *E. dabanensis, E. youngi youngi,* and *E. youngi herscheli.* Although the pattern on the medial side of the antenna club may be faded to obscurity in a very few specimens, when present, this pattern will always approach one of the above figures.

of *E. dabanensis* and *E. kozhantshikovi*) and contain black pupils, not dark brown as in those of *E. lafontainei*; by the male's ventral hindwing, which has a blackish brown overall appearance as in that of *E. dabanensis* and *E. phellea*, although the mesial and marginal bands are usually much more pronounced than those of *E. phellea*; by the scattering of white scales in the postbasal and postmedian areas of the ventral hindwing which produces a hoary appearance as in that of *E. dabanensis*; and by the medial side of the antenna club, which is dark brown on the upper half and light ochre on the lower half (Fig. 41) as in that of *E. dabanensis*. Females and some males are further characterized by the fringe, which is checkered with darker brown at the tips of the veins as in females of *E. phellea, E. dabanensis,* and (rarely) *E. kozhantshikovi* (checkering absent in *E. lafontainei*).

Internally, *E. youngi* is characterized by the male valva which is not extended at the tip (extended in *E. phellea, E. dabanensis, E. kozhantshikovi,* and *E. lafontainei*). For this reason, the spined ridge on the valva of *E. youngi* occupies the least percentage of the total length of the costa of the entire complex at 43.0 ± 2.0%, with a range of 36-47% (N = 20). The shoulder of the spined ridge drops back to the neck of the valva at about 90° to the costa as in that of *E. dabanensis*, not at a gentle angle as in those of *E. phellea, E. lafontainei*, and *E. kozhantshikovi*. The spines may be fine or coarse (Figs. 46a-46d) and well separated or touching, depending on the individual.

Distribution and Habitat

Erebia youngi is found in dry tundra meadow and tundra fellfield habitats from the Richardson Mts., British Mts., Ogilvie Mts., and St. Elias Mts. of Canada's Yukon, west through the Brooks Range of Alaska, at least as far as Walker Lake in the Endicott Mts. (Fig. 42). The type locality is the mountains between Fortymile and Mission Creeks, Alaska (near the Alaska/Yukon border, roughly west of Dawson, Yukon).

The flight period is late June to late July.

Remarks

Dos Passos (1972) dissected two male syntypes of *E. youngi* and assigned one as the *E. youngi* lectotype and determined the other to be *E. dabanensis*. Our examination of these specimens shows that the *E. youngi* lectotype fits our concept of *E. youngi* (as it must), but the male syntype which do Passos determined to be *E. dabanensis* is *E. lafontainei*. A third *E. youngi* syntype in the Carnegie Museum, a female, is a specimen of *E. youngi*.

Erebia youngi herscheli Leussler, 1935

Diagnosis

Forewing length of male 20.0 ± 1.1 mm, range 18.5-21.5 mm (N = 20)

(all specimens from Herschel Island, Yukon Territory).

Erebia youngi herscheli (Figs. 5-8) is a distinct subspecies, characterized externally by the dull ochre-brown forewing ocelli which average smaller and darker than those of *E. youngi youngi*; by the very dull, obscure ventral hindwing which is chocolate-brown rather than blackish brown as in males of *E. youngi youngi*; and by the reduced amount of red around the black ocelli on the ventral forewing as in that of *E. youngi rileyi*. Internally, the male genitalia are identical to that of *E. youngi youngi*.

Distribution

Erebia youngi herscheli appears to be a coastal race of *E. youngi* in Yukon. Specimens we have examined from Herschel Island, Yukon and Kay Point on the nearby mainland are the only populations which we have studied that would belong to this taxon. Six worn specimens in the American Museum of Natural History, nominally labelled Aklavik, 11 & 24 VII 31 (Owen Bryant) were placed as *E. youngi herscheli* by dos Passos (1947). *Erebia youngi* does not occur at Aklavik, a forested area in the Mackenzie Delta, although it is not uncommon in the Richardson Mts., less than 50 km west of Aklavik. The actual location for Bryant's 11 VII 31 specimens is Base Camp, Husky River, 40 km SW of Aklavik, and his 24 VII 31 specimens were collected at Black Mountain, 50 km SW of Aklavik. Although these specimens tend to approach *E. youngi herscheli*, they are in very poor condition and little can be said about their subspecific rank in certainty. Specimens we have examined in longer and fresher series collected north of, south of, and opposite Aklavik in the Richardson Mts. do not approach *E. youngi herscheli* and are all *E. youngi youngi*. We have deleted Bryant's "Aklavik" specimens from the distribution of *E. youngi herscheli* (Fig. 42) and place them as *E. youngi youngi*, although further collecting in the Black Mountains area may prove otherwise. We see no evidence of a cline between *E. youngi youngi* and *E. youngi herscheli* in the Richardson Mts. or British Mts. and regard *E. youngi herscheli* as a valid subspecies.

Remarks

Leussler (1935) described *E. herscheli* as a distinct species from a series of three males collected from Herschel Island (O. Bryant). We have examined the holotype as well as a lengthy series (43 specimens) from Herschel Island and agree with dos Passos (1947) and Warren (1969) in that this race is conspecific with *E. youngi*.

After examining the holotype and two paratypes, dos Passos (1947) concluded that *E. youngi herscheli* usually has two rows of spines on the comb of the valva while *E. youngi youngi* has three, and that the spines are most numerous on the clasp of *E. youngi herscheli*, being closer together than on *E. youngi youngi*. Our examination of lengthy series of both races

indicates that the number of teeth, their arrangement on the valva, and their fineness is extremely variable within any population and cannot be used in subspecific determination.

There is no difference in size between *E. youngi youngi* (FW length 20.2 ± 1.2 mm) and *E. youngi herscheli* (FW length 20.0 ± 1.1 mm) as suggested in the original description of *E. herscheli* (Leussler, 1935).

Erebia youngi rileyi dos Passos, 1947

Diagnosis

Forewing length of male 21.5 ± 1.1 mm, range 19.5-24.0 mm (N = 20) (specimens from Denali National Park, Alaska).

Erebia youngi rileyi (Figs. 9-12) is distinguished from *E. youngi youngi* by the fulvous ocelli of the dorsal forewing which are usually smaller, duller, and contain smaller pupils than those of *E. youngi youngi*; by the fulvous ocelli of the ventral forewing, which are less often coalesced to form a broad submarginal band than those of *E. youngi youngi*; by the absence or reduced number of ocelli on the dorsal hindwing; by the ventral hindwing, on which the mesial and marginal bands are much more distinct, more heavily scalloped, and usually redder than those of *E. youngi youngi*; and by the antenna club, in which the nudum is usually equally dark above and below a light ochre median line as in that of *E. phellea* (Fig. 39). The male valva (Figs. 46b-46c) is similar to that of *E. youngi youngi*. The range of variation found in valva shape and spine coarseness (Figs. 46a-46d) is found in all populations of *E. youngi* that we have studied.

Distribution

E. youngi rileyi ranges from the type locality (Denali National Park) through the De Long Mountains and Cape Thompson areas of Alaska to the Seward Peninsula (Fig. 42). Specimens from extreme western Alaska differ from *E. youngi youngi* in the same characters as do specimens from Denali National Park; however, these differences are more extreme in specimens from the De Long Mountains and the Seward Peninsula and we do not hesitate to place them under this taxon. It is possible that a cline could exist between *E. youngi youngi* and *E. youngi rileyi* in the western Brooks Range, although we have not seen specimens that would suggest this.

Remarks

It is interesting to note that dos Passos (1972) determined the *E. youngi* lectotype to be dissimilar to *E. dabanensis* but the *E. youngi rileyi* holotype to be *E. dabanensis*. These determinations were made on the basis of genital characters only. Although not stated in that paper, the only character which could have led dos Passos to that conclusion is the coarser spines on the valva of the *E. youngi rileyi* holotype. The spines on the valva

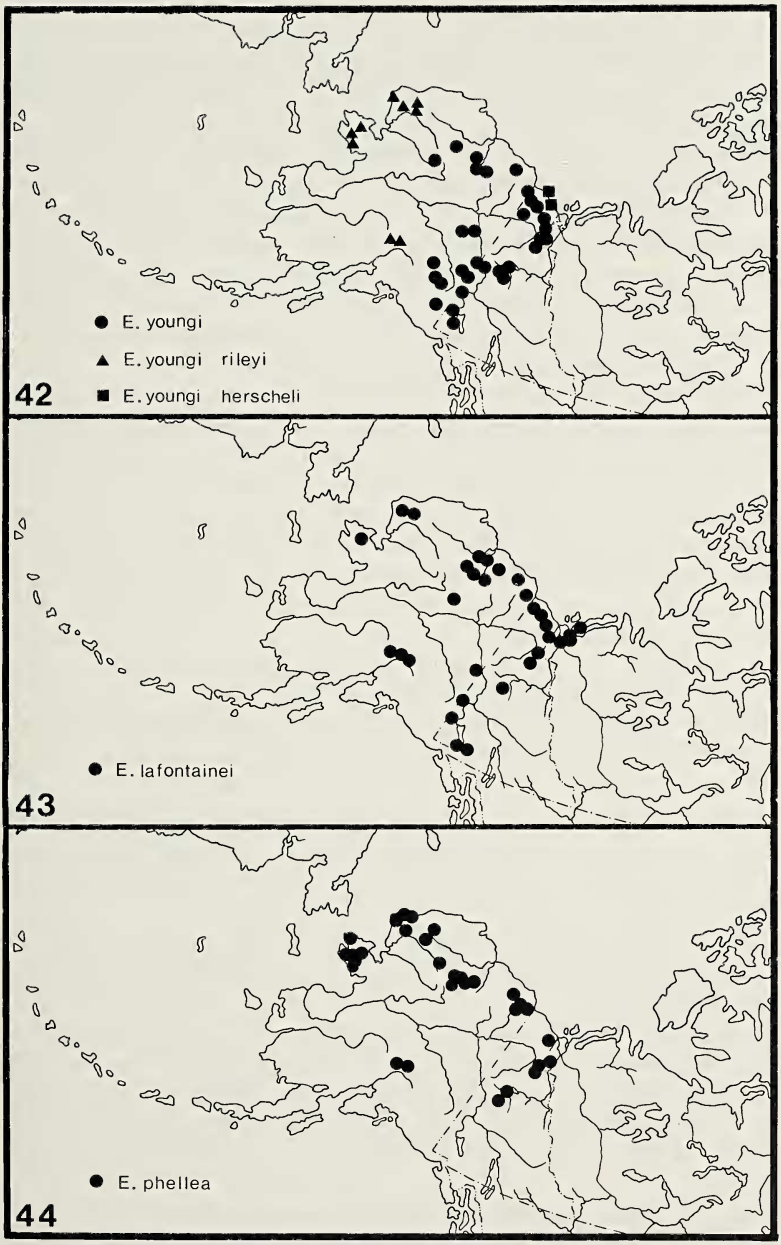
of *E. dabanensis* are very coarse and well separated; however, those of *E. youngi* can be coarse, fine, or anything in between. The tip of the valva of *E. youngi* is never narrowed and pointed to the same degree as that of *E. dabanensis*. Our examination of the *E. youngi rileyi* holotype has revealed that this specimen has nothing to do with *E. dabanensis* and is hereby placed as a subspecies of *E. youngi* (once again).

Although the *E. youngi rileyi* holotype (Figs. 9, 10, 46c) is *E. youngi*, the type series is mixed. We examined the holotype, allotype, and 23 paratypes. The holotype and seven paratypes are *E. youngi rileyi*, the allotype and five paratypes are *E. phellea*, and 11 paratypes are *E. lafontainei*. Dos Passos (1947, p. 3) states that "From the eight dissections of *youngi*, no positive conclusions can be drawn. There is considerable variation among specimens from the same locality." The reason that there was considerable variation among specimens from the same locality is that dos Passos was looking at three distinct species, and the variation within each of those three species is not that great at all.

Given this confusion, it is surprising that so many of the characters by which dos Passos differentiated *E. youngi rileyi* from *E. youngi youngi* are valid differences. Only two characters given by dos Passos (1947) are invalid in separating these two subspecies: *E. youngi rileyi* usually has black pupils in the forewing ocelli, they are not often absent as suggested by dos Passos; and *E. youngi rileyi* (FW length 21.5 ± 1.1 mm) is not smaller than *E. youngi youngi* (FW length 20.2 ± 1.1 mm), although specimens from the Seward Peninsula and Cape Thompson Areas are slightly smaller than those from Denali Park. Both of these erroneous differences are more diagnostic of *E. phellea* and must not be associated with *E. youngi rileyi*.

Erebia phellea Philip & Troubridge, **new species**

Description. Male: (Figs. 25, 26, 37 & 38) mean alar expanse 36.1 ± 2.0 mm (N = 20, TL), range 31.8-39.0 mm. **Forewing**: mean length 19.1 ± 1.0 mm (N = 20, TL), range 16.1-20.2 mm. (Note: Richardson Mts.: FW mean length 21.2 ± 1.2 mm (N = 20)). Bolshoi Annachag Range: FW length 22.1 ± 0.9 mm (N = 20). **Dorsal Forewing**: ground color dark brown with four ochre-red to ochre-orange submarginal ocelli, usually containing minute black pupils (approx. 0.3 mm in expanse, up to 1.0 mm in Siberian specimens) in cells, M_1, M_2, M_3, and CU_1. The anterior two pupils usually noticeably larger than the posterior pair, and sometimes the entire ocellus shows similar size differences. In flight, freshly emerged males show a faint bluish, almost iridescent, sheen. Fringe generally concolorous with wing, but somewhat lighter at base of fringe forming an indistinct paler band parallel to and just beyond margin of wing membrane. **Dorsal Hindwing**: ground color dark brown, slightly darker towards wing base, with three to five small (to about 0.8 mm in most



Figs. 42-44. (42) distribution of *E. youngi* and its subspecies in North America; (43) distribution of *E. lafontainei* in North America; (44) distribution of *E. phellea* in North America.

specimens, occasionally to about 1.5 mm) ochre-red to ochre-orange submarginal ocelli, usually containing minute (to about 0.25 mm in most specimens, occasionally to 0.5 mm, and up to 1 mm in a few Siberian specimens) black pupils. Some Siberian specimens lack HW ocelli. Fringe concolorous with wing, with less tendency than FW to have a post-membranal lighter band. **Ventral Forewing**: ground color dark brown, very lightly suffused with dark rust-brown scales, and sometimes a postmedian-submarginal orange flush. Four ochraceous submarginal ocelli correspond with those present on dorsal surface. These ocelli have small black pupils, again with the anterior pair usually larger than the posterior pair. Fringe generally concolorous with wing, but again with a post-membranal lighter band. **Ventral Hindwing**: hairs white to creamy tan (light brown in Siberian specimens), giving wing obscure dark gray cast. Ground color of entire wing dark brown to blackish brown with a light suffusion of rust-brown and light pearl gray scales (gray scales lacking in most Siberian material, giving wing a sooty look) across entire wing, slightly heavier in postbasal and submarginal areas; an obscure, crenulate mesial band is edged by slightly darker brown bands (the band barely visible in may specimens); submarginal ochraceous ocelli with black pupils correspond with those present on dorsal surface (ocelli lacking in some Siberian specimens); marginal band absent except in some individuals from the Alaska Range, and about half of the specimens from the Magadanskaya Oblast'; fringe concolorous with wing.

Male Genitalia: (Figs. 50, 51a-51c, 52-55) mean length of costa of valva (distance "A" in Fig. 58) 1.83 ± 0.09 mm, range 1.83-1.97 mm (N = 20). Valva with short, wide neck and long tapered tip. Raised ridge at distal end of valva with many fine spines scattered in no particular order or number along costal margin of ridge and down slope to neck, usually stopping at neck but occasionally extending onto neck for a short distance. Raised, spined portion of valva 67.2 ± 2.5%, range 62-72% (N = 20) of entire length of costal margin of valva (see Fig. 58). Distal edges of vertical processes of aedeagus sheath usually fairly straight, although this is not a reliable character.

Antenna: (Fig. 39) medial side of antenna club very dark brown as illustrated, usually with light ochre median line. Dark brown on either side of median line may be reduced to equal sized patches of dark brown on upper and lower halves of nudum within each segment. Size of these patches variable in different specimens, but top half never darker than lower half.

Female: (Figs. 27, 28, 30, 32, 37, 38) mean alar expanse 36.9 ± 1.2 mm (N = 15, TL), range 34.1-39.0 mm. **Forewing**: mean length 18.9 ± 0.7 mm (N = 15, TL). (Note: Richardson Mts. mean length 21.3 mm (N = 3). Bolshoi Annachag Range: FW length 21.6 ± 0.47 mm (N = 8)). **Dorsal Forewing**: ground color paler than male, submarginal ocelli ochre-yellow

and often slightly larger than those of male. A dusting of white (Alaska/Canada material) or gray (Siberian material) scales at apex. Gray scales along anterior edge of costa. These white or gray scales produce a pearly sheen on the insect in flight. Fringe lighter than ground, checkered with darker brown at tips of veins (lightness and checkering most marked in western Alaska material, least marked in Magadanskaya Oblast' material). **Dorsal Hindwing**: as in male but lighter ground color. **Ventral Forewing**: ground color lighter than male. A pronounced submarginal ochre-red, ochre-yellow, or grayish brown band is present on most specimens, containing the ocelli which may or may not contrast with the band. The black pupils are usually larger than those on the dorsal surface. Fringe pale and checkered (Seward Peninsula and western Brooks Range) to concolorous and faintly checkered (northeastern, Alaska Range, and Magadanskaya Oblast' material). **Ventral Hindwing**: hairs white (western Alaska) to tan (northeastern and Alaska Range) to light brown (Magadanskaya Oblast'). General pattern as in male, but a heavy dusting of pearly gray scales presents (especially in western Alaska material) a pronounced hoary appearance (except Magadanskaya Oblast' material where the gray scales do not contrast as much with the ground color). Fringe as on VFW.

Type Series

Holotype male: Alaska: Seward Peninsula, km 66-68 Council Rd., 9-11 km NNE of Solomon (64.63N, 164.37 W), 60-180 m, 29 VI 1971 (D. G. Roseneau) in the National Museum of Natural History, Washington, D.C., U.S.A.

Paratypes, 471 males, 117 females:

N.W.T.: Richardson Mts.: Dempster Highway, km 491, 26 VI 1980 (J. D. Lafontaine & D. M. Wood), 4 males and 2 females in the ALS, 9 males & 1 female in the CNC.

Yukon Territory: Richardson Mts.: Dempster Highway, km 465, 23-28 VI & 5-7 VII 1980 (J. D. Lafontaine & D. M. Wood), 2 males & 1 female in the ALS, 6 males in the CNC; Dempster Highway, km 416, 22-28 VI 1980 (J. D. Lafontaine & D. M. Wood), 2 males in the ALS, 1 male in the CNC; Dempster Highway, km 406, 19 VI 1981, (J. T. Troubridge), 3 males in the Troubridge collection. Ogilvie Mts.: Dempster Highway, km 155, 18-20 VI 1980 (J. D. Lafontaine & D. M. Wood), 1 male in the ALS; Dempster Highway, North Fork Pass, 12 & 20 VI 1962, (R. E. Leech & P. J. Skitsko), 2 males in the CNC; Dempster Highway, km 140, 1-4 VII 1973 (D. M. Wood), 1 male in the ALS.

Alaska: NW Coast: Cape Lisburne, 8 VII 1977, (A. Springer), 11 males & 2 females in the ALS; Saligvik Ridge, Ogotoruk Valley (near Cape Thompson), 7-19 VII 1977, (K. W. Philip), 17 males & 5 females in the ALS. North Slope: Utukok R., 13 km SW and 14.5 km SSW junction with Carbon Creek, 25 VI-4 VII 1974, (K. W. Philip), 67 males (1 dep. J. Zeligs) & 15 females in the ALS; Noluck Lake, 1-6 VII 1972, (K. W.

Philip & C. Parker), 4 males & 3 females in the ALS. Brooks Range: DeLong Mts.: Wulik Peaks, head of Kivalina River, 13 VII 1974, (K. W. Philip), 1 male in the ALS. Western Brooks Range: Akuliak Lake, 8 km NE of Howard Pass, 3 VII 1981, (J. Zeligs), 1 male in the ALS, 1 male in the Troubridge collection. Brooks Range: Endicott Mts.: Nanushuk Lake, 8 VII 1971, (J. L. Harry), 1 male in the ALS; Kollutuk Mt., 8 km SSW Anaktuvuk Pass, 20 VII 1971, (J. L. Harry), 1 male in the ALS; Rumbling Mt., 8 km ESE Anaktuvuk Pass, 21 VI 1971, (J. L. Harry), 1 male in the ALS; VABM Yenituk, 22.5 km SW Anaktuvuk Pass, 23-27 VI 1971, (J. L. Harry), 6 males & 3 females in the ALS; 5 km SW of Atigun Pass, 6 VII 1979, (D. Faulkner), 2 males in the ALS; N side Atigun Gorge, 14 VII 1979, (J. Shepard), 1 male in the ALS; ridge 5 km N of N end of Galbraith Lake, 9 VII 1979 (K. W. Philip), 1 female in the ALS. Brooks Range: Franklin Mts.: Lake Schrader, hill between Spawning Ck. & Sadlerochit R., 8 VII 1973, (K. W. Philip), 1 female in the ALS; E. side Lake Peters, 1 VII 1973, (C. Batten), 1 male in the ALS; Whistler Ck., W of Lake Peters, 8 VII 1973, (C. Batten), 2 males & 1 female in the ALS. Brooks Range: British Mts.: Kongakut River, 5 km N of Paulaluk River, 7 VII 1975, (R. Ritchie), 2 males & 1 female in the ALS. Brooks Range: Davidson mts.: headwaters of Sheenjek River, 16 VI 1975, (C. Batten), 1 male in the ALS. Seward Peninsula: Tin City, 19 VII 1977, (D. A. Woodby), 1 male in the ALS; N fork Kougarok River, 3 km ESE Harris Dome, 1-2 VII 1971, (K. W. Philip & D. G. Roseneau), 25 males & 7 females in the ALS; head of Willow Creek (trib. of Penny River) nr km 22.5 Teller Rd., 14 VI 1970, (D. G. Roseneau), 5 males & 1 female in the ALS; W. side of Sinuk River, 6.5 km above Teller Road bridge, 8 VI 1970, (D. G. Roseneau), 1 male in the ALS; km 29 Teller Road, 13 VI & 5 VII 1970, (D. G. Roseneau), 5 males & 2 females in the ALS, 24 VI 1971, (D. G. Roseneau & A. Springer), 4 males in the ALS, 4-5 VII 1971, (K. W. Philip & A. Springer), 7 males & 5 females in the ALS, 21 VII 1976, (K. W. Philip & D. P. Oosting), 4 males & 3 females in the ALS, 30 VI & 13 VII 1980, (C. S. Guppy), 87 males & 9 females in the Guppy collection; km 34 Teller Road, 22 VII 1976, (K. W. Philip & D. P. Oosting), 3 males in the ALS, 22 VI 1980, (C. S. Guppy), 5 males & 1 female in the Guppy collection; Wheel Creek (trib. Penny River), 2 VII 1971, (D. G. Roseneau), 1 male in the ALS, 21 VI 1980, (C. S. Guppy), 4 males & 1 female in the Guppy collection; km 82 Kougarok Road, 17 VII 1980, (C. S. Guppy), 2 males & 1 female in the Guppy collection; km 64.5 Kougarok Road, head of Star Creek, 29 VII 1980, (C. S. Guppy), 1 female in the Guppy collection; 3 km N of km 58 Kougarok Road, 16 VII 1980, (C. S. Guppy), 20 males & 10 females in the Guppy collection; km 51.5-53 Kougarok Road, 4 VII 1980, (C. S. Guppy), 1 male in the Guppy collection; km 45 Kougarok Road, 8 & 18 VII 1980, (C. S. Guppy), 98 males & 18 females in the Guppy collection; km 42 Kougarok Road, 10 VII 1980, (C. S. Guppy), 12 males & 3 females in the Guppy collection; km 66-68 Council Rd., 9-11 km NNE Solomon, 19 VI 1970, (D. G. Roseneau), 1 male in the ALS, 12 VI 1971, (W. L. Foster), 4 males & 2 females in the ALS, 29 VI 1971, (D. G. Roseneau, A. Springer, & W. Walker), 27 males & 13 females in the ALS, 15-16 VII 1979, (J. Zeligs), 1 male & 1 female in the ALS, 2 males & 1 female in the Troubridge collection. Alaska Range: Denali National Park: Cathedral Mt., 25 VI 1972, (P. Pyne), 1 female in the ALS, Teklanika River, 2.5 km SSE Teklanika Campground, 14 VI 1972, (T. Bundtzen), 1 male in the ALS. Rampart House (?): North Creek, no date or collector, 1 female in the NMNH. (Note: There are three "North Creeks" listed in Orth's Dictionary of Alaska Place Names (1967)). One is in the Aleutian Islands, and may be neglected. One is on the Seward Peninsula N of Teller, an area

from which we know of no butterfly specimens in any museum collection. The third is in the Talkeetna Mts., near Palmer, where some collecting was done in the early 1900's. There are other specimens of rockslide species in the NMNH labelled "Rampart House, North Creek, Alaska (Barnes coll.)," and since this specimen has a "Barnes coll." label, its most probable location is Rampart House, Alaska/Yukon border.

The total number in the type series is 589 specimens. Samples of the Alaska paratypes will be deposited in the CNC, NMNH, the Troubridge collection, and the Zoological Institute, Academy of Sciences, Leningrad, U.S.S.R.

Distribution and Habitat

(Figs. 44 & 45) *Erebia phellea* is found in suitable scree and blockfield habitats from the Richardson Mts. of the N.W.T., west and south through the British Mts. and Ogilvie Mts. of the Yukon, west throughout the Brooks Range in Alaska, the Seward Peninsula, and in the Alaska Range (Denali National Park). One locality for the species has been found in the Magadanskaya Oblast', U.S.S.R., in the Bolshoi Annachag Range, upper Kolyma River. Aside from that locality, nothing is known about this species' distribution in NE Siberia, but further collecting in the many mountain ranges in Chukotka and the western Magadanskaya Oblast' may yield additional localities.

Erebia phellea is a denizen of dry, rocky habitats, preferring gravel to heavier block scree. Through much of its range it is found flying with *Clossiana distincta* (Gibson, 1920), and *Erebia magdalena mackinleyensis* (Gunder, 1932)—but if any given site has well-demarcated areas of block and gravel scree, then *E. phellea* will usually be restricted to the gravel, while the other two rockslide species will be found in greatest abundance on the blocks. The flight period for *E. phellea* is mid-June to late July, with emergence at approximately the same time as *E. lafontainei* and about two weeks before *E. youngi*.

Diagnosis

Erebia phellea is characterized externally by its very obscure ventral hindwing, which has no obvious marginal band (except individuals from Denali National Park, Alaska; and approximately half of the specimens from the single locality in the Magadanskaya Oblast') and has a very indistinct mesial band in most specimens; by the four ochre forewing ocelli which have very tiny (but up to 1 mm in some Magadanskaya Oblast' specimens) or absent black pupils; by the antenna which has an equal amount of dark brown on either side of a pale ochre median line along the medial side; and by the hairs on the ventral wing surfaces which are whitish or tan, never red. Internally, *E. phellea* is characterized by the male valva which is long and pointed, has a wide neck, many very small teeth extending across the costa of the comb, thence down to the neck of the

valva; and by the raised comb which occupies 62-72% of the entire length of the costa of the valva.

Remarks

Erebia phellea exhibits a large degree of geographic variation over its 3500 km east-west range. Specimens from the Richardson Mts., eastern Brooks Range, and the Ogilvie Mts. (Figs. 29 & 30) differ from those from the Seward Peninsula and western Brooks Range as follows: the northeastern populations have a larger size (about 2.5 mm greater FW length), pupils in the dorsal ochre-red submarginal ocelli which are smaller or more often absent, and a wide submarginal red patch usually present on the ventral forewing (a feature which is present on some western Alaska specimens but with decreasing frequency towards the Seward Peninsula). Specimens from the Alaska Range (Figs. 31 & 32) most closely approach the northeastern populations but will often have more distinct marginal and mesial bands on the ventral hindwing. Specimens from the Bolshoi Annachag Range (Fig. 38) are even larger than the Richardson Mts. specimens (about 3.3 mm larger than the western Alaska specimens), have larger black pupils in the forewing ocelli than any North American populations (up to 1 mm in diameter), a narrow submarginal band on the ventral forewing in about half of the specimens, and faint but unmistakable marginal bands on the ventral hindwing (again, in about half the individuals). Ecologically, the Bolshoi Annachag Range is not dissimilar to the Alaska Range foothills in Denali National Park, so the appearance of a marginal VHW band in both these populations is possibly an indication of environmental similarities.

The variation from the Richardson Mts. to the Seward Peninsula may not suggest naming the extremes as subspecies, since various characters (as: FW length, VFW submarginal band, color of ocelli, hoariness of female VHW, etc.) do not correlate well. The Magadanskaya Oblast' material is distinct enough that it would have been separated immediately as a subspecies had it been discovered in the early days of northern collecting—but we hesitate to describe it in the face of our total ignorance about the variation of this species (if any) from Chukotka to the Kolyma River. A clinal intergrade to Seward Peninsula material is possible, and further collecting in the Magadanskaya Oblast' is needed before any meaningful subspecific assignments can be made.

Erebia phellea can be separated from all other species of the *E. dabanensis* complex by the antenna, wing, and genital characters given in the key. In addition, the spines on the ridge of the male valva of *E. phellea* are more numerous and much finer than those of *E. youngi, E. dabanensis,* and *E. lafontainei.*

Erebia phellea is most closely related to *E. dabanensis* and *E. youngi* (see Fig. 59), but remains distinct in every part of its range. Nowhere have we

seen specimens which could be considered intermediate between *E. phellea* and any other species of the *E. dabanensis* complex, and species status is therefore warranted. We name this new species *E. phellea, phelleus* from Greek, meaning stoney ground.

Warren (1930) described *E. kozhantshikovi* ab. *rubescens* from one specimen from the Sayan Mountains, and in 1936 redescribed it as *E. dabanensis* ab. *rubescens*, giving figures of facies (pl. 84, figs. 1176 & 1182) and genitalia (pl. 42, fig. 384). Comparison of Warren's figures with specimens of *E. phellea* from the Aborigen Station suggests a strong possibility that *E. phellea* may fly in the Sayan Mountains, although we hesitate to draw firm conclusions from a single specimen which the authors have not examined. The name *rubescens* is unavailable for this taxon because it was described as an aberration and is an unavailable infrasubspecific name.

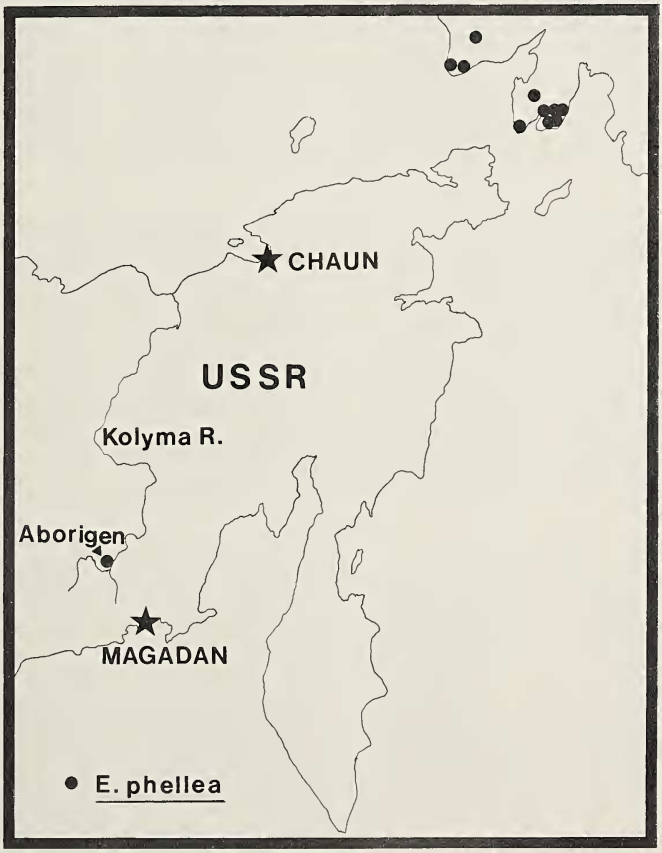


Fig. 45. Distribution of *E. phellea* in Eastern Siberia.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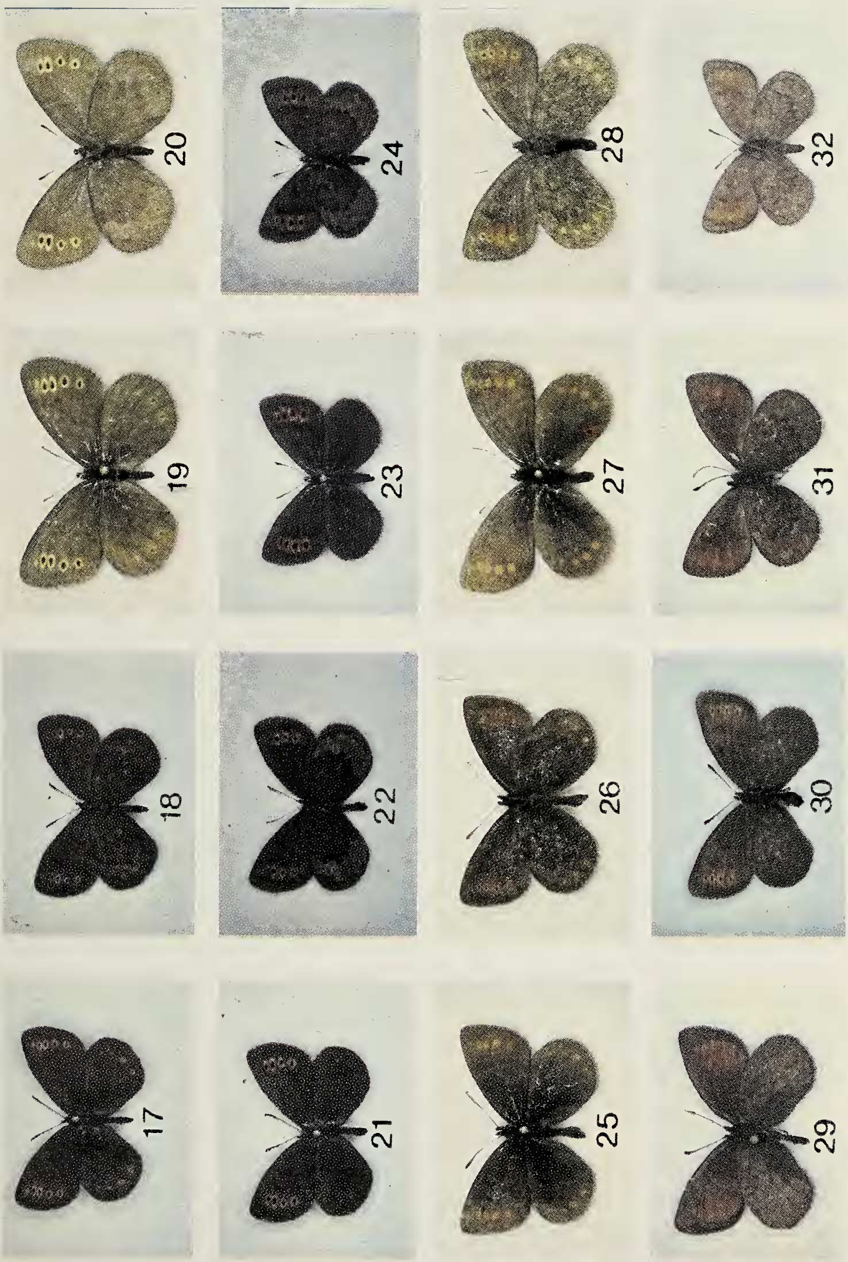
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Figs. 1-4. *E. youngi youngi*: (1) male, dorsal view; (2) male, ventral view; (3) female, dorsal view; (4) female, ventral view, all from Windy Pass, Ogilvie Mts., Yukon, 16 VI 1981, J. Troubridge Leg.

Figs. 5-8. *E. youngi herscheli*: (5) male, dorsal view; (6) male, ventral view; (7) female, dorsal view; (8) female, ventral view, all from Herschel Island, Yukon, 23 VII 1953, C. D. Bird, Leg.

Figs. 9-12. *E. youngi rileyi*: (9) holotype male, dorsal view; (10) holotype male, ventral view; (11) paratype female, dorsal view; (12) paratype female, ventral view, all from McKinley Park, Alaska, 19-20 VI 1932.

Figs. 13-16. *E. dabanensis*: (13) male, dorsal view; (14) male, ventral view, both from E. side Pik Vlastnyi, S.E. end Range Bolshoi Annachag, Magadanskaya Oblast', U.S.S.R., 15 VII 1980, K. W. Philip Leg.; (15) female, dorsal view; (16) female, ventral view, both from Chulugaischa, Mondy Sajan Mont, Buryat Republic, U.S.S.R., 2300 m, late June, 1926.

Figs. 17-20. *E. kozhantshikovi*: (17) male, dorsal view; (18) male, ventral view; (19) female, dorsal view; (20) female, ventral view, all from E. side Pik Vlastnyi, S.E. end Range Bolshoi Annachag, Magadanskaya Oblast', U.S.S.R., 28-30 VI 1978, K. W. Philip, Leg.

Figs. 21-24. *E. lafontainei*: (21) holotype male, dorsal view; (22) holotype male, ventral view; (23) paratype female, dorsal view; (24) paratype female, ventral view, all from N. slope Mt. Decoeli, St. Elias Mts., Yukon, 1300 m, 27 VI 1982, J. Troubridge & L. Lang, Leg.

Figs. 25-32. *E. phellea*: (25) holotype male, dorsal view; (26) holotype male, ventral view; (27) paratype female, dorsal view; (28) paratype female, ventral view, all from km 62, Council Rd., Seward Peninsula, Alaska, 29 VI-4 VII 1971, D. G. Roseneau, Leg.;(29) male, ventral view; (30) female, ventral view, both from km 416, Dempster Hwy., Richardson Mts., Yukon, 22-28 VI 1980, J. D. Lafontaine & D. M. Wood, Leg.;(31) male, ventral view; (32) female, ventral view, both from McKinley Park, Alaska, 20 VI 1932.

Erebia kozhantshikovi Sheljuzhko, 1925

Diagnosis

Forewing length of male 20.6 ± 0.6 mm, range 19.0-22.4 mm (N = 20) (Note: 10 of these specimens from Bolshoi Annachag Range, Magadanskaya Oblast', and 10 specimens from Sredne-Kolmysk, Province Yakutsk, NE Siberia).

Erebia kozhantshikovi (Figs. 17-20, 36) is characterized externally by the dorsal forewing ocelli, which usually are five in number (all other species of the *E. dabanensis* complex normally have four DFW ocelli) and contain distally pointed elliptical black pupils similar to those of *E. lafontainei* and *E. youngi*; by the dorsal hindwing, whose submarginal ocelli are larger and

more numerous than those of *E. lafontainei, E. youngi,* and *E. phellea*, and have black pupils (dark brown in *E. lafontainei*); by the ventral forewing, which has a submarginal row of fulvous ocelli which are reduced to narrow halos around large black pupils (never coalesced to form a submarginal fulvous band as in *E. dabanensis, E. youngi*, and less frequently, *E. lafontainei*); by the ventral hindwing, which has a heavy scattering of pearl-white scales within cell M_2 of the postmedian-submarginal band, becoming very heavy toward and along the mesial band within this cell; by the medial side of the antenna club (nudum), which has a dark brown median patch (see Fig. 40) as in *E. lafontainei*; and by the fringe of the female which is rarely checkered with dark brown at the tips of the veins (fringe never checkered in *E. lafontainei*).

Internally, *E. kozhantshikovi* is characterized by the male valva (Figs. 49 & 57) whose spines are very fine as in *E. phellea* (never coarse as in *E. dabanensis* and *E. lafontainei*); by the spined ridge of the valva which occupies $50.1 \pm 3.4\%$ of the entire length of the costa (a smaller proportion than those of *E. phellea, E. dabanensis*, and *E. lafontainei*, a greater proportion than that of *E. youngi*), and is not usually elevated above the neck of the valva to the same degree as those of the other four species within this complex; and by the vertical processes at the distal end of the aedeagus sheath, which are usually greatly concave as in those of *E. lafontainei* (not usually flat or slightly concave as in *E. dabanensis, E. phellea*, and *E. youngi*).

Distribution and Habitat

Erebia kozhantshikovi ranges from the 120th meridian (Yablonoi Mts., Vilui and Olenek Rivers) to the Magadanskaya Oblast'. Kurentzov places it along the north coast of the Sea of Okhotsk from about 140 to 155 degrees east, and mentions a published record for northern Korea, but Kurentzov's determinations in this group are suspect until his material is re-examined. K. Philip found *E. kozhantshikovi* flying in mixed larch/deciduous forest at the Aborigen Station, Magadanskaya Oblast', U.S.S.R. (very abundant in 1978, somewhat rare in 1980). K. Philip and E. A. Makarchenko collected this species at the Chaun Station (base of Chaun Gulf, Chukotka, 170 degrees east) in 1978, in lush tundra meadow/shrub tundra. The ALS collection has material (from Soviet volunteer collectors) from the Detrin River, Jack London Lake, Stokovoye (all in the Okhotsk-Kolyma Uplands), and Kremyanka (30-40 km west of Ust' Chaun). The ALS also has one specimen of *E. kozhantshikovi* from the Indigirka River, Yakutia, which had been determined by its collector as *E. tundra* (presumably from the erroneous genitalia figures in Kurentzov (1970)).

The flight period of *E. kozhantshikovi* is mid-June to mid-July.

Type locality: Dzhugdzhur Mountains at the headwaters of the Dzhelinda River, U.S.S.R.

Erebia tundra Staudinger, 1887

Remarks

No diagnosis is possible, since we have no access to material of this taxon. Whatever its status, *E. tundra* should be mentioned here, since it is listed as a species occurring in the Magadanskaya Oblast' in Korshunov's catalogue (1972), and also in Kurentzov (1970).

and Kurentzov (1970) also treats it as a species and states that *E. tundra* and *E. dabanensis* are allopatric species in the Magadanskaya Oblast', with *E. tundra* being the more northern and eastern in distribution. We have seen figures of the valva of *E. tundra* (Chapman, 1898, p. XV, figs. 51x a & b) and have seen a color figure of the type (Staudinger, 1887). From this information, we concur with Warren (1936) in that *E. tundra* is probably conspecific with *E. dabanensis*.

Kurentzov's figures for the genitalia of *E. tundra* and *E. dabanensis* match Warren's (1936) figure of *E. kozhantshikovi*, and vice versa. Kurentzov's key (using wing facies only) to *Erebia* appears inconsistent for these three taxa, and it is therefore not possible to decide what Kurentzov meant by the name "*E. tundra*". We should also mention that Chapman's figures of the genitalia of *E. dabanensis* (1898, pl. XV, figs. 51b & c) do not fit our concept of *E. dabanensis* and are probably assignable to *E. kozhantshikovi* (as pointed out in Warren (1936)).

We received one specimen attributed to *E. tundra* from Dr. Elena Antonova (Zoological Museum, Moscow University), which on dissection proved to be *E. kozhantshikovi* (see Fig. 56). We are thus reduced to noting the occurrence of the name "*E. tundra*" in the recent Russian literature, without being able to decide which of the *E. dabanensis* complex species is being referred to. Our best estimate is that a northern population of *E. kozhantshikovi* is currently being assigned the name "*E. tundra*" by Russian lepidopterists.

Erebia lafontainei Troubridge & Philip, **new species**

Description. Male: (Figs. 21, 22, 35) mean alar expanse 36.9 ± 1.7 mm (N = 20, TL) range 33.5-40.0 mm. **Dorsal Forewing:** mean length 20.1 ± 1.0 mm (N = 20), range 18.0-22.3 mm. Ground color dark brown with four fulvous submaginal ocelli with black pupils in cells M_1, M_2, M_3, and CU_1. These pupils oval or elliptical with narrowest end on the distal side. Fringe concolorous with wing. **Dorsal Hindwing:** ground color dark brown with zero to four dull, fulvous submarginal ocelli. These ocelli usually very small (mean width 0.6 mm) with dark brown pupils absent, although ocelli may reach 1.5 mm in width and rarely have dark brown pupils (never black). Fringe concolorous with wing. **Ventral Forewing:** hairs red. Basal area gray-brown with very heavy suffusion of bright rust-red scales, extending

distally to slightly darker postmedian line. Submarginal band of light gray-brown suffused with rust-red scales contains single fulvous ocelli in cells M_1, M_2, M_3, and CU_1. These submarginal ocelli may coalesce to form a submarginal band and extend into anterior portion of cell CU_2 in occasional specimens. These ocelli have single black pupils. Crenulate marginal band dark gray-brown basally, light gray-brown distally, and heavily suffused with bright rust-red scales. White scales absent in apical area. Fringe concolorous with wing. **Ventral Hindwing**: hairs red. Basal area dark brown, heavily suffused with rust-red scales; postbasal band gray-brown with light suffusion of rust-red scales and very light scattering of grayish white scales near submedian band; base of mesial band medium to dark brown, heavily suffused with rust-red scales, curved distally within discal cell; centre of mesial band gray-brown, heavily suffused with bright rust-red scales, pearl-white scales absent; outer edge of mesial band medium to dark brown, heavily suffused with rust-red scales, curved inward along each vein (and again mid-way through each cell to a lesser degree in many specimens); postmedian-submarginal band light gray-brown, very heavily suffused with pearlescent pink and light rust scales; submarginal fulvous ocelli correspond with those, if present, on dorsal surface; marginal band light gray-brown, very heavily suffused with bright rust-red scales and scalloped inward between veins; veins within marginal band edged with slate-gray scales; fringe concolorous with marginal band. The ventral hindwing has an overall smooth, reddish-brown or maroon appearance, due to the absence of white scales which would produce a hoary appearance, and due to the light gray-brown ground color which does not overpower the effect produced by the suffusion of rust-red scales.

Male Genitalia: (Fig. 48) mean length of costa of valva (distance "A" in Fig. 58) 1.64 ± 0.07 mm, range 1.57-1.77 mm ($N = 20$). Valva with raised ridge at tip with many coarse spines scattered in no particular order or number along costal margin of ridge. Raised, spined portion of valva $54.3 \pm 2.0\%$, range 50-59% ($N = 20$) of entire length of costal margin of valva (distance "B" in Fig. 58). Distal edges of vertical processes of aedeagus sheath usually greatly concave, although this is not a reliable character.

Antenna: (Fig. 40) medial side of antenna club (the side which faces the other antenna) light ochre along dorsal and ventral margins with dark brown to light brown patch centrally located and tapering to a point toward posterior end of club. This dark patch is rarely faded to obscurity. Caution is advised in examining dried specimens for antenna characters, as medial side of club (nudum) could be mis-located, depending on how the antenna dried.

Female: (Figs. 23, 24, 35) mean alar expanse 37.4 ± 1.7 mm, range 35.0-40.5 mm ($N = 20$, TL). **Dorsal Forewing and Hindwing**: mean length of forewing 20.7 ± 0.9 mm, range 19.0-22.5 mm ($N = 20$). As in the male but ground color slightly lighter brown. Fringe concolorous with wing,

checkering at tips of veins absent. **Ventral Forewing**: as in that of male but hairs orange-red and submarginal band and basal areas suffused with orange-rust scales, which produces ligher overall appearance than that of male. **Ventral Hindwing**: hairs red; basal area gray-brown, heavily suffused with light rust scales; postbasal band pinkish to buff, lightly suffused with light rust scales; base of mesial band medium brown, heavily suffused with light rust scales, curved slightly outward within discal cell; centre of mesial band light brown, heavily suffused with light rust scales; outer edge of mesial band medium brown, heavily suffused with light rust scales and scalloped as in that of male; postmedian-submarginal band light gray-brown, heavily suffused with light rust scales; submarginal ocelli correspond with those, if present, on dorsal surface; marginal band as in that of male but suffusion of rust scales more orange than red. Fringe as in forewing.

Type Series

Holotype male: Yukon: St. Elias Mts., Mt. Decoeli, 1300 m, 27 VI 1982 (J. T. Troubridge & L. E. Lang), in the Canadian National Collection (CNC), Ottawa, Ontario, Canada.

Paratypes, 223 males, 83 females:

N.W.T.: Tuktoyaktuk, 21 miles (34 km) E, 20-25 VI 1971, (D. M. Wood), 6 males & 1 female in the CNC; Reindeer Depot, 1-10 VII 1948, (W. J. Brown & J. R. Vokeroth), 14 males & 6 females in the CNC; Richardson Mts., SW of Aklavik, 2-6 VII 1955, (C. Wyatt), 5 males in the American Museum of Natural History (AMNH); Inuvik, 7-10 VII 1982, (Q. Hess), 4 males & 7 females in the Troubridge collection.

Yukon Territory: St. Elias Mts., Mt. Decoeli, N slope, 1229-1384 m, 27 VI-2 VII 1982, (K. W. Philip), 21 males and 10 females in the Alaska Lepidoptera Survey collection (ALS), (Troubridge & Lang), 37 males & 6 females in the CNC, 36 males & 21 females in the Troubridge collection; St. Elias Mts., Nickel Creek, 1300 m, 3-6 VII 1982, (Philip), 6 males in the ALS, (Troubridge & Lang), 10 males & 8 females in the Troubridge Collection; St. Elias Mts., Bear Creek Pass, 30 VI-1 VII 1976, (C. S. Guppy), 6 males & 5 females in the Guppy collection; St. Elias Mts., Kluane Lake, S end, 28 VII 1974, (D. Scovell), one pair in the Scovell collection; Dempster Highway, km 416, 26 VI 1969, (Troubridge), 1 male in the Troubridge collection; Dempster Highway, km 83, 23 VI 1979, (Troubridge), 1 female in the Troubridge collection; Dempster Highway, km 90, 14 VI 1981 (Troubridge), 1 male in the Troubridge collection; Firth River; 13-17 VII 1976, (R. E. Leech & E. F. Cashman), 7 males & 1 female in the CNC; Dempster Highway, km 465, 23-25 VI 1980, (J. D. Lafontaine & D. M. Wood), 1 male in the CNC.

Alaska: Dalton Highway, km 97-110, hills N of Sagwon, 8-9 VII 1979, (F. & J. Preston), 5 males in the Troubridge collection, 4 males in the Preston collection; N ridge of Atigun Gorge, 13-14 VII 1979, (F. & J. Preston), 2 males in the Preston collection; Kivalina River, 14 VII 1974, (Philip), 2 males & 1 female in the

Troubridge collection, 1 male in the ALS; Utukok River, 24 VI 1974, (Philip), 2 pair in the Troubridge collection, 4 males & 1 female in the ALS; Itigaknit Mtn., 3 VII 1976, (Philip), 1 male in the Troubridge collection, 29 VI 1976, (D. Oosting), 1 male in the Jim Scott collection; 3 km ESE Harris Dome, 1 VII 1972, (Philip), 4 males & 3 females in the Troubridge collection; Anaktuvuk Pass, 13-15 VII 1970, (Philip), 4 males & 1 female in the AMNH; Okpilik Lake, 11 km NNE Mt. Michelson, 28 VI 1958, (Wm. Malcolm), 1 male in the AMNH; Umiat, 8-13 VII 1952, (G. W. Rawson & P. F. Bellinger), 10 males & 4 females in the CNC, 2 males in the James Scott collection, 6 VII 1959, (R. Madge), 1 male in the CNC, 5 VII 1959, (E. H. Martin), 1 male in the CNC; McKinley National Park (now Denali National Park), Highway Pass, 18 VII 1976, (Guppy), 2 males in the Guppy collection; McKinley Park, 17 VI-10 VII 1932, (ex. dos Passos coll.), 9 males (including 1 *E. youngi rileyi* paratype) in the AMNH, 5-6 VII 1938, (ex. Engelhardt coll.), 3 males (including 1 *E. youngi rileyi* paratype) in the AMNH, 7-15 VII 1930, (ex. Gunder coll.), 8 males & 4 females (including 8 *E. youngi rileyi* paratypes) in the AMNH.

The total number in the type series is 307 specimens. Samples of the Yukon paratypes will be deposited in the Carnegie Museum, the United States National Museum, and in the Zoological Institute, Academy of Sciences, Leningrad, U.S.S.R.

Distribution and Habitat

Erebia lafontainei occurs from the Mackenzie delta of the N.W.T., west through the Richardson Mts., Ogilvie Mts., British Mts. and St. Elias Mts. of Yukon, the Alaska Range, Brooks Range, and North Slope of Alaska, to the Seward Peninsula. Although we have no record of its occurrence in British Columbia, it is found very near the British Columbia border in S. Yukon and may extend southward into that province (see Fig. 43).

Erebia lafontainei is a denizen of low shrub tundra, both arctic and alpine. Adults usually rest in the small patches of short sedge which are found between the low willows (*Salix niphoclada*, Rydberg, *S. lanata*, Linnaeus, *S. pulchra*, Chamisso) and birches (*Betula nana*, Linnaeus, *B. glandulosa*, Michaux) or in frost boils, where they are sheltered from the wind. Adults will often stray over fellfield or scree when their shrub tundra habitat comes in close contact with these other arctic biotopes.

The flight period is mid-June to late July, adults appearing on the wing one to two weeks ahead of *E. youngi* where they are sympatric.

Diagnosis

Erebia lafontainei is characterized externally by the broad dark brown patch, centrally located on the medial side of the antenna club; by the reddish appearance of the ventral hindwing, which lacks white scales and never has a grizzled or hoary appearance; by the red hairs of the ventral surface; by the gray-brown ground color of the ventral hindwing (never dark brown) which does not overpower the influence of the scattering of red scales; by the fulvous patches of the ventral forewing which are usually

reduced to a series of fulvous ocelli; and by the very small hindwing fulvous ocelli which usually lack pupils (however, when present are dark brown, not black). The female is further characterized by the lack of white scales within the marginal band at the tips of the veins, and by the fringe, which is never checkered with darker brown at the tips of the veins. Internally, *E. lafontainei* is characterized by the male valva, in which the spined ridge occupies 50-59% of the combined length of the toothed and untoothed portions of the costa. The pattern, length, proximity to one another, or number of spines must not be used in any attempt to separate *E. lafontainei* from *E. youngi* due to the individual variation exhibited by these characters (especially in the case of *E. youngi*). The above characters will separate *E. lafontainei* from *E. youngi* and *E. phellea*. Microscopic examination is required to determine the color of the pupils in the dorsal hindwing ocelli, the ground color of the ventral hindwing, and often to check the fringe of the female for checkering at the tips of the veins.

Remarks

The geographic variation between populations of *E. lafontainei* is not extreme. Specimens which we have examined from the Seward Peninsula of Alaska agree well with those from the rest of its range in Alaska and northern Canada in internal and external characters. There is no evidence of a cline toward *E. kozhantshikovi* in western Alaska. Populations from the Richardson Mts., Ogilvie Mts., Mackenzie Delta, and Seward Peninsula tend to have fewer hindwing ocelli than those from the St. Elias Mts. and Alaska Range. Specimens from the North Slope and Seward Peninsula average slightly smaller than those from the other areas within its range. Neither of these character differences are significant enough to name a subspecies.

Erebia lafontainei can be separated from all other species of the *E. dabanensis* complex by the antenna, wing, and genital characters given in the key. In addition, *E. lafontainei* can be separated from *E. youngi* and *E. phellea* by the ground color of the ventral hindwing, which is gray-brown in *E. lafontainei* (dark brown to blackish brown in *E. youngi* and *E. phellea*). Unfortunately, microscopic examination is required to see the ventral hindwing ground color as it is obscured by the presence of rust-red scales in all three species.

Erebia lafontainei is most closely related to *E. kozhantshikovi* but remains distinct in every part of its range. Nowhere have we seen specimens which could be considered intermediate between *E. lafontainei* and any of the other species of the *E. dabanensis* complex, and species status is therefore warranted. We take pleasure in naming this new species in honor of J. Donald Lafontaine, who has freely given hours of his time to assist in this and other projects undertaken by the authors.

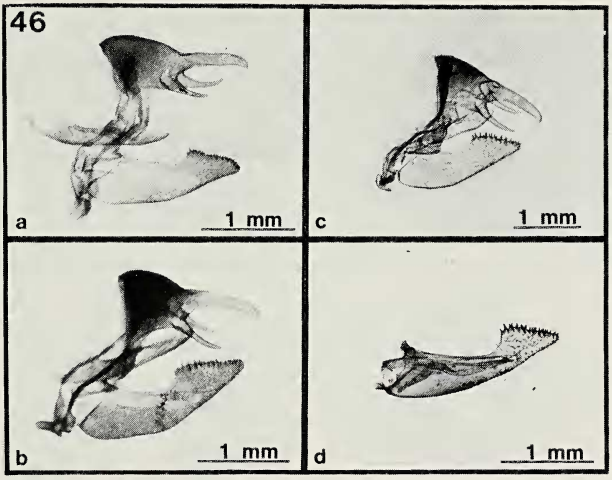


Fig. 46. Male genitalia of *E. youngi*, lateral view: (a) *E. youngi youngi*, Windy Pass, Ogilvie Mts., Yukon; (b) *E. youngi rileyi*, Ogotoruk Creek, Cape Thompson, Alaska; (c) *E. youngi rileyi* holotype, McKinley Park, Alaska, all with right valva removed and showing variation of tooth pattern and shape of valva; (d) right valva of *E. youngi herscheli*, inside view.

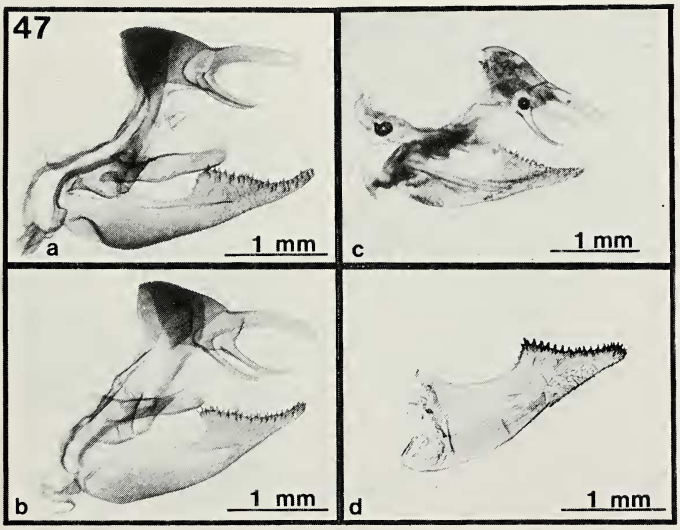


Fig. 47. Male genitalia of *E. dabanensis*, lateral view: (a-c) S.E. end Range Bolshoi Annachag, Magadanskaya Oblast', U.S.S.R., showing range of variation of male valva within a given population, the right valva has been removed for better viewing; (d) Chara Daban, Sajan Mont, Buryat Republic, 2000 m, inside view of right valva.

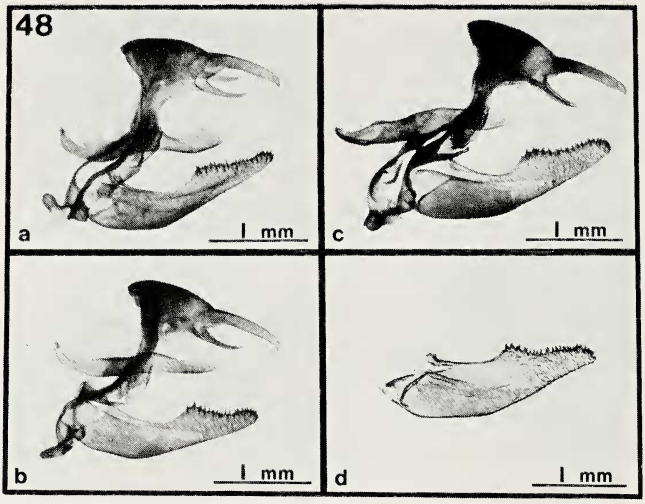
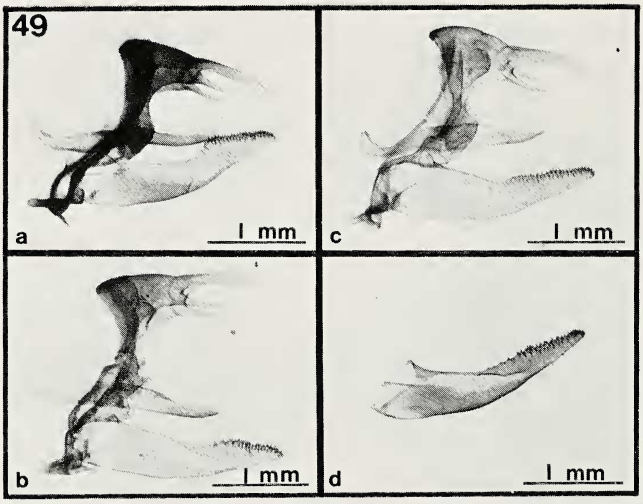


Fig. 48. Male genitalia of *E. lafontainei*, lateral view: (a & b) Harris Dome, Seward Peninsula, Alaska; (c) Inuvik, N.W.T., all with right valva removed, showing variation of valva shape; (d) Umiat, North Slope, Alaska, inside view of right valva.



Figs. 49. Male genitalia of *E. kozhantshikovi*, lateral view: (a & b) Sredne-Kolymsk, Province Yakutsk, N.E. Siberia, U.S.S.R., Lat 68°; (c) S.E. end Range Bolshoi Annachang, Magadanskaya Oblast', U.S.S.R., Lat 61°, all with right valva removed, showing range of variation in valva shape; (d) Range Bolshoi Annachag, Magadanskaya Oblast', U.S.S.R., inside view of right valva.

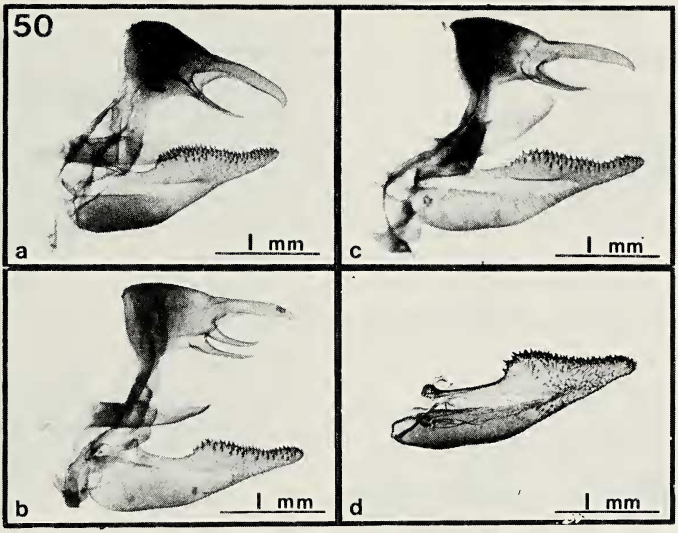


Fig. 50. Male genitalia of *E. phellea*, lateral view: (a-c) km 416-471, Dempster Hwy., Richardson Mts., Yukon, all with right valva removed, showing range of variation of tooth pattern and valva shape; (d) km 416, Dempster Hwy., Yukon, inside view of right valva.

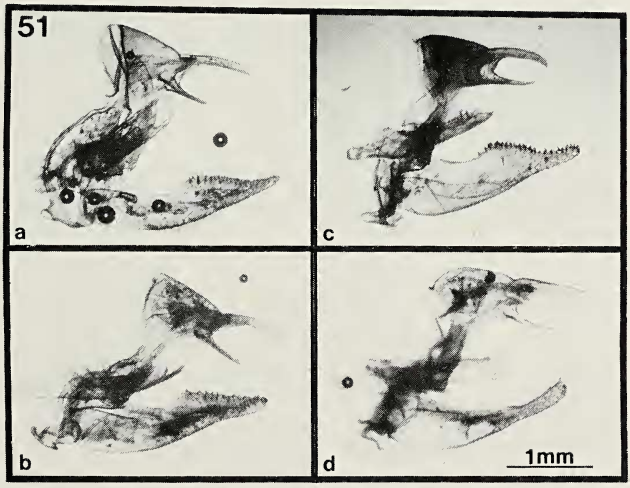


Fig. 51. Male genitalia of *E. phellea* and *E. fletcheri*: (a) *E. phellea*, (b) *E. phellea*, both lateral views from the Aborigen Station, Magadanskaya Oblast', 29 VI-5 VII 1980, A. C. Jones & K. W. Philip, Leg., (c) *E. phellea*, holotype, km 66-68 Council Rd., Seward Peninsula, Alaska, 29 VI 1971, D. G. Roseneau, Leg., (d) *E. fletcheri*, lateral view, Aborigen Station, Magadanskaya Oblast', 22 VI 1978, E. G. Matis, Leg.

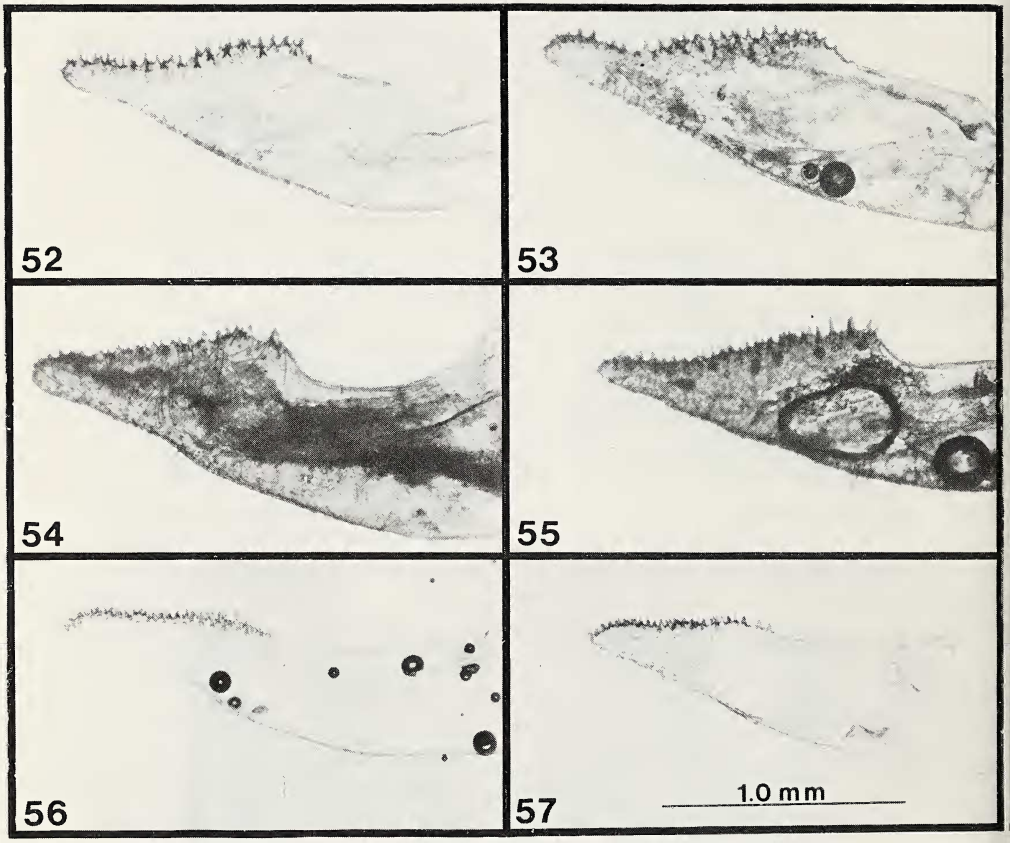


Fig. 52. Valva of *E. phellea*, Utukok River, Alaska, 1 VII 1974, (K. Philip).

Fig. 53. Valva of *E. phellea*, Lake Peters, Alaska, 8 VII 1974, (C. Batten).

Fig. 54. Valva of *E. phellea*, Aborigen Station, Magadanskaya Oblast', 5 VII 1980, (K. W. Philip).

Fig. 55. Valva of *E. phellea*, same data as Fig. 54.

Fig. 56. Valva of *E. kozhantshikovi*, Indigirka River at mouth of In'yali River, 16 VI 1976, V. Kovalev, Leg. (this specimen had been previously determined to be *E. tundra*).

Fig. 57. Valva of *E. kozhantshikovi*, Chaun, Chukotka, 25 VI-15 VII 1978, E. A. Makarchenko, Leg.

EXCLUDED TAXA

Erebia inuitica Wyatt, 1966

Remarks

Erebia inuitica was named from one specimen, supposedly caught by an Eskimo boy on the north slope of the Endicott Mts. (Anaktuvuk Pass) in Alaska. Warren (1968) states that this specimen is closest to *E. christi* (Ratzer, 1890), and "had it been taken in the European Alps, one could scarcely have done other than to accept it as a race of *E. christi*." However, *E. christi* has black forewing ocelli which *E. inuitica* lacks, so the wings and genitalia closely resemble those of *E. pharte* (Hubner, 1804). Warren's dissection of the holotype proved it to be a member of the *epiphron* group of the genus *Erebia* and not the *alberganus* group.

We have studied photographs of the genitalic dissection of *E. inuitica* (Warren, 1968 & 1981). The valva of *E. inuitica* is very narrow in the distal one third and has no raised comb. The spines on the valva are coarser, fewer, and further apart than those of *E. phellea*, (the only member of the *E. dabanensis* complex which could slightly resemble *E. inuitica*). We have tried rolling the valva of *E. phellea* to approximate the rolled valva of *E. inuitica*; however, from no angle does it approach that of the *E. inuitica* holotype. We have obtained color photographs of the *E. inuitica* holotype and have not seen Nearctic specimens of any species which could be confused with it. We have determined that *E. inuitica* is not conspecific with either of our new species.

Although it is possible that *E. inuitica* does exist in Alaska, we feel that *E. inuitica* may have been described from a mislabelled specimen of *E. christi* or *E. pharte* from the European Alps, and that until a further series is taken in Alaska, *E. inuitica*'s species status should remain dubious. Kenelm W. Philip's trip to Anaktuvuk Pass in 1970 failed to produce *E. inuitica*. Subsequent discussions with Roosevelt Paneak, who collected for Wyatt, revealed that although he could not remember catching any particular specimen, he did not collect far from the village site and always collected on low tundra areas, never near scree.

Erebia fletcheri Elwes, 1899

Remarks

Kurentzov (1970) put *E. fletcheri* as a race of *E. dabanensis*, and others have done the same as pointed out in Warren (1930). Externally, *E. fletcheri* closely approaches *E. dabanensis*, but the male genitalia of *E. fletcheri* are completely different from anything in the *alberganus* group.

K. Philip collected *E. fletcheri* flying together with *E. dabanensis* and *E. kozhantshikovi* at the Aborigen Station, Magadanskaya Oblast', in 1978 and 1980. These specimens match Warren's figures (1936) for that

species except for having one rather than two terminal spines on the valva (see Fig. 51d).

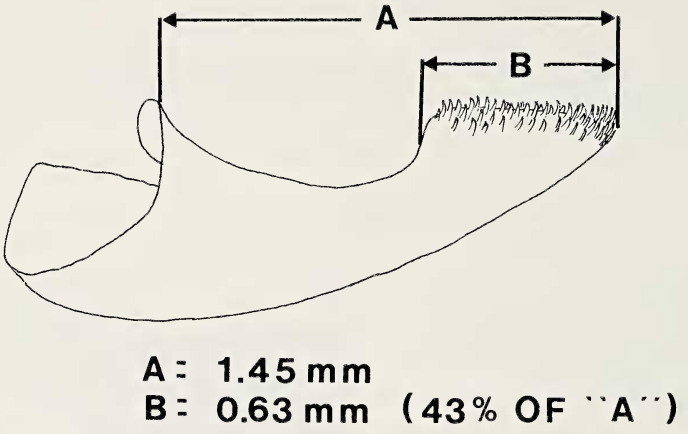


Fig. 58. Male valva of *E. youngi*, showing method used in its measurement. Distance "A" is measured from the point where the vertical process of the basal end meets the costa, to the tip. Distance "B" is measured from the tip, to a point mid-way down the shoulder of the spined ridge.

Zoogeography

The *Erebia dabanensis* complex is chiefly Beringian. During the Wisconsin Glaciation, which reached its height about 20,000 years ago, the Cordilleran and Continental ice sheets of North American coalesced, effectively isolating much of northern Yukon and Alaska from the rest of North America. During this period, sea level fell by at least 115 meters, and the land bridge between Alaska and Siberia was restored. Although Alaska was isolated from central North America for 6,000 to 10,000 years, a vast area of tundra and grassland connected Siberia and Alaska. With the exception of large glaciers in the Koryak Mts., Anadyr Range, and Chukhotsk Peninsula, northeast Asia remained largely unglaciated. The repeated opening of dry land between Alaska and Chukotka during the various glacial advances may have allowed the ancestral forms of the *E. dabanensis* complex to move back and forth and speciate. With the end of the Wisconsin Glaciation came the final opening of the Bering Strait and the last time that endemic populations could have been genetically continuous with their ancestral forms.

In North America, *E. youngi, E. lafontainei*, and *E. phellea* have not extended their ranges more than a few hundred kilometers beyond the unglaciated areas of Alaska and Yukon. The very limited dispersal ability exhibited by these species is due to their weak flight capabilities, their very

specific habitat requirements, and their short lifespans. We see no evidence of ancestral species of the *E. dabanensis* complex having survived Wisconsin ice in refugia south of Beringia. We know that many other arctic species were present in North America during the Sangamon Interglaciation (before Wisconsin ice), as many of these species survived the Wisconsin Glaciation in refugia located in Alberta and Colorado, as well as in Beringia (e.g. *E. magdalena, E. theano* Tauscher, 1809). As *E. youngi, E. phellea,* and *E. lafontainei* did not repopulate from the southern refugia after the retreat of Wisconsin ice, it is possible that their ancestral forms invaded North America from Siberia as recently as 20,000 years ago. However, it is also possible that these species survived the Illinoian Glaciation in Alaska and did not extend their ranges into central North America during the Sangamon period. Unfortunately, we have no way of knowing for certain where these species originated, we can only speculate.

Ecological Separation of Species

In North America, *E. youngi, E. lafontainei,* and *E. phellea* are often sympatric. All three species fly together in the Richardson Mountains, Yukon, at the head of the Kivalina River (western Brooks Range), and at Harris Dome in the Seward Peninsula of Alaska. *Erebia youngi* and *E. lafontainei* fly together at the Utukok River (western Brooks Range), and at Nickel Creek (St. Elias Mts., Yukon), where the authors found good numbers of both species feeding together at the same mud puddles in 1982. We found *E. phellea* sympatric with *E. youngi* in many localities in the Richardson Mountains and Ogilvie Mountains of Yukon, and at many localities in the Seward Peninsula of Alaska. In each of these localities, *E. phellea* did not stray far from the scree, *E. youngi* did not stray far from the tundra meadow and fellfield, and *E. lafontainei* did not stray far from the low shrub tundra. It is not uncommon for all three of these habitats to be found in very close proximity to one another, and often all three will abut one another, especially in the low foothills of our arctic mountain ranges. In this situation, all three species may occur sympatrically, and ample opportunity for interbreeding occurs; however, we have seen no evidence of hybrids.

No real chronological separation of these species is evident in any part of their respective ranges. *Erebia lafontainei* and *E. phellea* usually appear on the wing one to two weeks before *E. youngi*, but both are on the wing throughout most of the flight period of *E. youngi.*

In the U.S.S.R., *E. kozhantshikovi* is found in mixed larch/deciduous forest as well as in areas of shrub tundra. It flies with *E. dabanensis* in the Bolshoi Annachag Range, Magadanskaya Oblast', in open larch bog habitats. At the Aborigen Station in the Bolshoi Annachag Range, *E. phellea* flies with *E. dabanensis* on very dry rocky spurs just above treeline,

and is strictly limited to that habitat, although *E. dabanensis* is present from larch bog at 450 m to alpine tundra and fellfield at 1675 m.

Discussion

There has been confusion among these *Erebia*, because all previous work on the *E. dabanensis* complex in North America was based on very few specimens, none of which were collected by the authors. Holland (1900) described *E. youngi* on the basis of four specimens collected by Rev. S. Hall Young in Eastern Alaska. The type series of both *E. youngi* and *E. youngi rileyi* contained specimens of our new species, as noted above. The authors have examined over 2,000 Nearctic and about 500 Palearctic specimens of the various species of this complex.

Warren (1969) was convinced that *E. youngi* and *E. dabanensis* occurred together in Alaska. In trying to distinguish between these two species, he states that "in *E. dabanensis* the length of the spined ridge is greater than that of the corresponding ridge of the proximal part; in *E. youngi* it is markedly shorter, in *E. dabanensis* the spines are coarse and well separated;. . . in *E. youngi* very fine and touching," and that "so far as available material goes, it is doubtful if *E. youngi* and *E. dabanensis* can be distinguished by their superficial appearance." Clearly, Warren was using only genital characters to separate *E. dabanensis* from *E. youngi*, placing specimens with coarse teeth and short comb as *E. youngi*. The result of this was the determination of all specimens of *E. youngi* with fine teeth on the valva as *E. youngi* and all specimens of *E. youngi* with coarse teeth (like the *E. youngi rileyi* holotype), all *E. lafontainei*, and all *E. phellea* as *E. dabanensis*. Although Warren clearly stated that the spined ridge on the valva of *E. dabanensis* is longer than the ridge of the neck of the valva, no attention was paid to this most important character when the *E. youngi rileyi* holotype was determined to be *E. dabanensis* (dos Passos, 1972). The spined ridge on the valva of the *E. youngi rileyi* holotype occupies only 43% of the entire length of the costa (Fig. 46c) and is not narrowed and pointed at the tip as we see in that of *E. dabanensis*.

Warren and dos Passos suggested that both *E. youngi* and *E. dabanensis* occurred in Alaska. We have demonstrated that this is not the case. The question which should have been asked is whether or not *E. dabanensis* and *E. youngi* are conspecific. Externally, *E. youngi* approaches *E. dabanensis* in every character in which it differs from *E. lafontainei*. Although slight differences in number, size, and shape of the submarginal ocelli do occur between *E. youngi* and *E. dabanensis*, one would find it difficult to pick a specimen of one out of a long series of the other without looking at the genitalia. The most significant structural difference between *E. youngi* and *E. dabanensis* is in the male valva; that of *E. dabanensis* with a much longer, more pointed and narrower tip than that of *E. youngi*, and the teeth on that of *E. dabanensis* being consistently coarse, whereas those

of *E. youngi* are extremely variable and may be very fine to very coarse. These discrete differences in the male genitalia are consistent throughout the range of *E. youngi*, with no cline present between the Seward Peninsula or Cape Thompson, Alaska, populations and those of the Richardson Mountains, N.W.T. Similarly, we see no evidence of a cline between specimens of *E. dabanensis* which we have studied from the south end of Lake Baikal and the Magadanskaya Oblast', U.S.S.R., a distance of over 3200 km. Further collecting of *E. dabanensis* within the Chukhotsk Peninsula, U.S.S.R., is required before we can fully understand the geographic variation exhibited by *E. dabanensis*.

As *E. youngi* and *E. dabanensis* are separated by the Bering Strait and are therefore allopatric, there is no contact zone between them. However, the valva differences between them are well outside the range of variation we would expect to see between two subspecies. and are even greater than those between other species in the genus which are sympatric (e.g. *E. magdalena* and *E. fasciata* Buter, 1868). As *E. youngi* shows no evidence of a cline towards *E. dabanensis* in western Alaska, and *E. dabanensis* shows no evidence of a cline towards *E. youngi* from the Buryat Republic to the Magadanskaya Oblast', U.S.S.R., we do not hesitate to treat them as full and separate species.

Erebia lafontainei is very distinct from *E. dabanensis, E. phellea*, and *E. youngi*. While there is no doubt that three species of the *E. dabanensis* complex occur in North America, it is important to note that two of these species, *E. youngi* and *E. lafontainei*, are not most closely related to each other but have their most closely related counterparts in the U.S.S.R. It is of interest to note that in many external characters in which *E. lafontainei* differs from *E. dabanensis* and *E. youngi*, it approaches *E. kozhantshikovi*. The antenna club of *E. kozhantshikovi* is identical to that of *E. lafontainei*, the ventral hindwing of both species are reddish and neither appears grizzled or hoary, and the ochre submarginal band on the ventral forewing is usually reduced to a series of ocelli in both species. However, the hindwing maculation of *E. kozhantshikovi* is far more extreme than that of *E. lafontainei*, especially in that of the female, and the fringe of female *E. lafontainei* is concolorous with the wing but that of *E. kozhantshikovi* may be checkered with darker brown at the tips of the veins. Internally, we see significant differences in the valvae of these two species (Figs. 48, 49, 57). The spined ridge of *E. kozhantshikovi* is extremely variable in the percentage of the total length of the costa which it occupies; however, it averages shorter than that of *E. lafontainei* as indicated above. The spined ridge of *E. kozhantshikovi* is normally not elevated above the neck of the valva to the same degree as that of *E. lafontainei*, and the spines on that of *E. lafontainei* are much coarser than those of *E. kozhantshikovi*.

Erebia lafontainei and *E. kozhantshikovi* are completely allopatric; however, they are more different from each other than are *E. youngi* and *E.*

dabanensis. One would never have any difficulty in picking a specimen of *E. lafontainei* out of a long series of *E. kozhantshikovi* by facies alone, and similarly, a specimen of *E. kozhantshikovi* would not be lost in a lengthy series of *E. lafontainei*. As the differences between *E. lafontainei* and *E. kozhantshikovi* are as great, or greater than many species of *Erebia* which are sympatric (and species in this genus are separated by relatively small differences (e.g. *E. sudetica* Staudinger, 1861 and *E. melampus* Fuessli, 1775)), we do not hesitate to treat them as distinct species.

The geographic variation we see in *E. phellea* is extreme, as noted above. Specimens from the Bolshoi Annachag Range, Magadanskaya Oblast', differ from specimens from Alaska by their larger size, their slightly darker hairs on the ventral hindwing, their larger ocelli, and by the more distinct mesial and marginal bands on the ventral hindwing. Internally, the male genitalia are identical to those of the Alaska populations (see Figs. 51a-c, 52-55). Although there are slight size and wing differences between these two populations, these differences are not outside the range of variation which we expect to see between subspecies. Since the male genitalia and habitat preference, as well as antenna characters, and many wing characters are similar between these two populations, we treat them as being conspecific.

Phylogeny of the *E. dabanensis* Complex

The cladogram shown in Fig. 59 illustrates our interpretation of the relationships among the species of the *E. dabanensis* complex, part of the *alberganus* group of Warren (1936). The *E. dabanensis* complex (lineage 1 of Fig. 59) has the following two character states that we consider derived: a crenulate VHW mesial band, and four submarginal forewing ocelli which lack white pupils. Members of lineage 2, consisting of *E. kozhantshikovi* and *E. lafontainei*, share the presence of a dark brown central patch on the medial surface of the antennal club, contrasting with the ochre dorsal and ventral surfaces. In lineage 3, to which belong *E. phellea, E. dabanensis* and *E. youngi*, the dark brown dorsal surface of the antennal club is sharply delineated from the ochre or brown ventral surface by a narrow ochre longitudinal line. Lineage 4, consisting of *E. dabanensis* and *E. youngi*, share the following character states: ground color of VHW dark brown; postbasal and postmedial areas of VHW with heavy scattering of white scales; angle between neck and apex of valva a right angle or less.

Conclusions

Three closely related species within the *E. dabanensis* complex occur in North America. These Nearctic species are not most closely related to each other, but have their most closely related counterparts in the U.S.S.R. *Erebia youngi/E. dabanensis*, and *E. kozhantshikovi/E. lafon-*

tainei are two sets of sister species occurring on either side of the Bering Strait. Although *E. youngi* and *E. lafontainei* closely approach their U.S.S.R. counterparts, significant differences are found between them and we treat them as separate species. *Erebia phellea* occurs on both sides of the Bering Strait, and although there is a large amount of geographic variation throughout its range, we consider the Palearctic and Nearctic populations to be conspecific.

Although *E. dabanensis* and *E. kozhantshikovi* do not occur in North America, we have not seen specimens from Chukotka, and do not know the status of the complex in that region. It is possible that the Bering Strait does not form the western limit of the ranges of *E. youngi* or *E. lafontainei*.

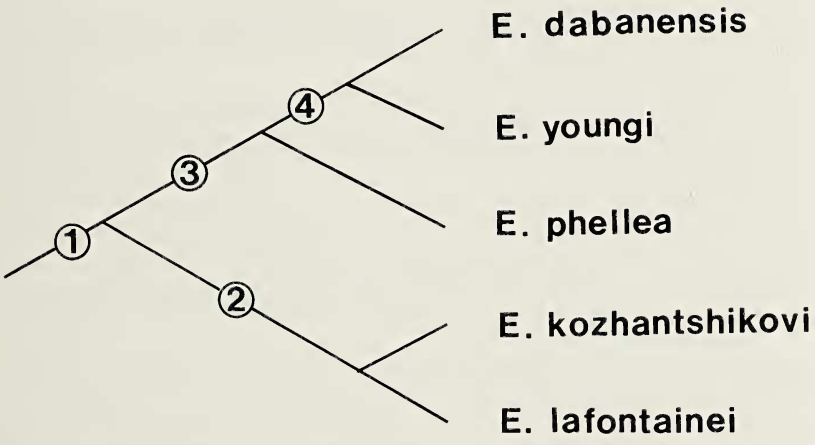


Fig. 59. Cladogram of the *Erebia dabanensis* complex.

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